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NEWSPAPER

Bell Low-Speed Modems Not Pacesetters

The Consumer Communications Reform Act of 1976, now pending before Congress, seeks to effectively eliminate competition within the telephone industry. One premise of the proposed legislation is that competition in communications has been detrimental.

This article is the second of two which examine the area of data communications equipment and the major product contributions made by independent competitors.

By Ronald A. Frank
Of the CW Staff

The emergence of independent suppliers into the low-speed data communications area in the early '70s spurred Bell to react with similar products.

The low-speed modem area is generally characterized by devices operating at 300-, 1,200- and 2,400 bit/sec. As independent suppliers began offering this type of modem, they typically provided users with more features at lower cost than comparable Bell data sets.

The additional features of the independent suppliers included diagnostic capabilities which allowed the user to test the line and modems to determine whether they were working correctly.

The Bell 103 modem was the workhorse of the 300 bit/sec area, but, beginning in 1970, the independent models offered improved performance. In order to counter the impact of the less expensive independent modems, Bell cut the price of its already-installed 103s.

In late 1970, Bell companies offered to convert the 103A from an originate/answer to an originate-only device. This conversion involved sending a Bell maintenance man to a customer site to disable part of the modem's features. The "new" modem then cost the user $10/mo instead of $25/mo.

The independent suppliers said the lower price meant Bell was

(Continued on Page 8)

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French in Quandry As Sicob Opens

By E. Drake Lundell Jr.
Of the CW Staff

PARIS – Governmental support for the French computer industry was in question here last week at the Salon International de l'Informatique de la Communication et de l'Organisation du Bureau (Sicob).

The night before the huge show opened, the French government announced an austerity program aimed at clamping down on inflation that has grown 12% this year.

The austerity program, announced by Prime Minister Raymond Barre, called for a cut in government spending to balance the budget, a temporary price freeze and wage guidelines. As Sicob opened, users and industry representatives alike were waiting for clarification of future funding plans for the French computer industry.

The government previously had supported a two-pronged approach. First, it practiced selective purchasing practices that aided the French industry and provided direct support to the firms. The second program involved

(Continued on Page 8)

IBM Cuts Prices 25% On Data Entry Gear

By Esther Surden
Of the CW Staff

ATLANTA – IBM last week made 25% cuts, effective immediately, in the purchase prices of key data entry equipment [illegible]m its General Systems Division (GSD). [illegible]e reductions include price cuts on most features of the Model 3741 data station/programmable workstation.

The cost of some communications features on the 3741, which uses floppy disks, were not reduced, an IBM spokesman noted.

Of the 51 machine types affected by the reductions, 13 are active products. The remainder have already been removed from rental and maintenance lists or will be removed from those lists in the future in accordance with past IBM announcements.

Rental and maintenance prices were not affected by the reduction announcement, the spokesman emphasized.

The price reductions, which cover such

(Continued on Page 4)

After 11-Month Suspension

New York Antes Up Revamped Lottery

By John P. Hebert
Of the CW Staff

ALBANY, N.Y. – New York State introduced a brand new instant lottery called "Empire Stakes" here this month, 11 months after the discovery of duplicate ticket numbers forced the old lottery to close down.

Gov. Hugh Carey's suspension of the games last October was followed by a study which revealed a programming error that caused the duplicate ticket numbers was only one of many problems in the state's lottery system [CW, Dec. 10].

Arthur D. Little, Inc. (ADL), author of the study, described the weekly games as "poorly designed, implemented, controlled and managed." The DP operation was hit hard by the ADL report.

The lottery commission was disbanded, 325 employees were suspended and a new effort was begun.

The DP functions have since been consolidated and made a division of the lottery commission itself. The lottery has been placed under the state's Department of Taxation and Finance Commission, according to Vincent Monitto, Director of Lottery Systems and Game Development. John D. Quinn, who successfully administered Michigan's lottery, now heads New York's reorganized lottery program.

The new games are being implemented in phases, according to a spokeswoman. Phase 1, scheduled to run until early November, was designed by Scientific Games Development Corp. of Atlanta, she said.

Players learn if they are winners by scratching off the wax coating from six boxes on each game ticket. Each box contains a dollar amount or the word "jackpot," the spokeswoman said.

If the amounts are the same in three boxes, the player wins that amount. If all six boxes contain the word "jackpot," the player wins $5,000, plus a 24 million-to-one chance to win $1,000/week at a ticket drawing, she explained.

The first drawing is expected to take place in mid-October, she noted.

A weekly game designed by Mathematica, Inc. will be phased-in sometime in November. In early January, an instant game will be resumed, followed by the operation of both games simultaneously,

(Continued on Page 4)

Carter Camp Using Terminals To Track Expenses, Opinion Data

By John P. Hebert
Of the CW Staff

ATLANTA – Both Gerald Ford and Jimmy Carter are relying on computer systems to efficiently reach large segments of the population in hopes of winning the November Presidential election.

But although both candidates are utilizing DP systems, they are using the technology in different ways and for different purposes.

Ford/Dole supporters are relying on the National Republican Congressional Committee (NRCC) to buy time on larger number- and name-crunching systems for a national telephone campaign involving 35 million to 40 million registered voters [CW, Sept. 13].

The Democratic camp, meanwhile, is putting $2,000/mo of its total $22 million federal campaign allowance toward on-site computer terminals tied into a national time-sharing service. Part of this allotment is also going toward an information service and the use of a local service bureau's mainframe, according to Steve Slade, chief systems analyst for the Carter Presidential campaign.

The terminals, which include three General Electric Co. (GE) Terminet 300s, a Hazeltine Corp. 2000 CRT, one GE Terminet 1200 char./sec printer and an APL language portable terminal, are located at campaign headquarters here, Slade said.

There are four additional terminals aboard Carter's and Mondale's leased United Airlines planes: two GE Terminet 300s as primaries and two Texas Instruments Silent 700s as backups connected to five 300 bit/sec dial-up phone lines while on the ground.

All of these communications-oriented devices are intended for use in two areas, Slade said.

The first is a business application based on the GE Mark III remote time-sharing service utilizing GE's Data Management System (DMS) for financial reporting and

(Continued on Page 2)

FEC Unveils Turnkey System To Monitor Campaign Dollars

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – The Federal Election Commission (FEC) unveiled the computer system here last week that will monitor federal campaign spending, beginning with the Presidential election this November.

For the first time, this multivendor system will make available to the commission and the public summaries and analyses of the money flow in national politics before an election occurs, according to FEC Chairman Vernon W. Thompson.

"In the past," he noted, "this kind of data was developed only long after the elections were over."

Not only will the system help keep candidates and their contributors honest by assisting the FEC in its audit and enforcement tasks, but it will be of "invaluable assistance" in hastening public disclosure of campaign finance information, Thompson added.

The commission plans to provide printouts of information contained in the system on a regular basis. In addition, the FEC will maintain a terminal that can be used by the public and the press as a research tool for selective inquiry of particular information in its Public Records Office, located here at 1325 K St. N.W., the commissioner stated. All of these services will be available at no charge.

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Navy Sources Say Maybe

F-14 Dip in Drink Caused by DP Failure?

By John P. Hebert
Of the CW Staff

WASHINGTON, D.C. – The U.S. Navy's top-secret F-14 Tomcat jet fighter which plunged into the Atlantic Ocean 75 miles west of Scotland two weeks ago may have been lost because a malfunctioning computer system caused one of the plane's two engines to race out of control, Navy sources said here last week.

They stressed, however, that the Navy is holding all judgments until the plane is recovered and examined for the exact cause of the accident.

The $14.3 million F-14, equipped with advanced computer and electronic navigational and weapons systems, missed the catapault of the carrier John F. Kennedy and hit the water beyond the flight deck at a speed of about 50 knots, the Navy sources said.

The plane's two pilots were ejected from the cockpit and landed on the carrier deck relatively unharmed, one source said.

The fully-deployed F-14 sank with a $500,000 Phoenix missile system, an automated multiple-target and simultaneous guidance missile system, an automated system for immunity to electronic countermeasures and a communications control system for pilotless operation.

When asked whether these were controlled by sophisticated computer systems, the spokesman said he imagined a man could not do these things.

The significance of the accident was heightened by confirmation late last week of reports from the *Washington Post* that a Soviet ship was shadowing the John F. Kennedy and remained in the immediate vicinity of the crash.

However, the Navy had no comment on whether it was attempting to retrieve the plane to prevent a Russian recovery and subsequent examination of the electronics or armament systems on board.

The Navy began recovery attempts last week because the F-14 is a "very valuable aircraft and to see what caused the accident. We want the entire package back," the spokesman stressed.

The search for the craft will utilize sidescan sonar and a navigation system for ocean-bottom triangulation of fixed points. Both location methods are necessary because of possible strong currents.

Terminals in Carter Camp Tracking Expenses

(Continued from Page 1)

expense itemization, he noted.

Data on campaign expenditures, including money spent for political advertisements, employee payroll, candidates' and campaign workers' expense accounts, telephone charges and travel expenses, are keyed into the DMS through the terminals, Slade said.

With nationwide bank accounts containing funds acquired during the Presidential primaries earlier this year and a payee list with 6,000 accounts, Carter's campaign organizers knew they would need – and planned for computer terminals, Slade said.

In addition, the campaigners are required by law to report all expenditures to the Federal Election Commission (FEC) and itemize amounts over $100, he added.

The FEC also required reports of income gained during the primaries to allocate federal matching funds, Slade said.

Information Sources

The second application is for communications utilizing information sources such as a public opinion research service in Cambridge, Mass., and the *New York Times* Information Bank.

One terminal, the Hazeltine 2000, is devoted to gathering information from the *New York Times* service at 1,200 bit/sec transmission speeds over dial-up telephone lines, Slade said.

But "the airplanes present unique stress problems for computer terminals," he said, citing reasons for the backup terminals.

The units on the planes are used for communications with campaign headquarters, itinerary scheduling, speech editing, political reports, press information and tracking flight charges accumulated by the press and Secret Service, Slade said.

Bills for plane fare are printed for the Secret Service and members of the press traveling with Carter and Mondale, and a general ledger of these transactions is updated on the DMS data base for FEC reporting, he added.

The FEC reports, Slade commented, would be "a prohibitive task to do manually."

Early in the campaign, Carter administrators "thought it wise to do the work with computers. They know how to get good results out of computers. It's a tool they think can be put to good use," Slade explained.

A third application involves an Atlanta-based service bureau which has an IBM 360, Slade said. On a weekly basis, this system collates mailing lists from letters received from prospective Carter and Mondale supporters.

When campaign headquarters gets the names of possible supporters, letters of response are sent to these people asking for volunteer work during the campaign.

The names are also sent to a Carter worker in the field who contacts the letter writers by telephone for the same reason, Slade noted.

At the end of each week, a list which provides names and addresses of prospective volunteers is sent to the service bureau to be sorted by state and Zip Code, he said.

The "Zip sort" is actually a cities sort, enabling the Carter/Mondale workers to coordinate the search for volunteers, he said.

The service bureau also maintains a mailing list for printing name and address labels for political mail sent on a regular basis to sympathetic elected officials and media organizations, Slade added.

The emphasis on computer terminals and systems is intended to hold the line on campaign costs by maintaining tight books. "We want to make sure we don't spend the $22 million in the first three weeks," Slade explained.

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3	**Texaco**
4	**Ford Motor**
5	**Mobil Oil**
6	**Standard Oil of California**
7	**International Business Machines**
8	**Gulf Oil**
9	**General Electric**
10	**Chrysler**
11	**International Tel. & Tel.**
12	**Standard Oil (Ind.)**
13	**U.S. Steel**
14	**Shell Oil**
15	**Atlantic Richfield**
16	**Continental Oil**
17	**E. I. du Pont de Nemours**
18	**Western Electric**
19	**Proctor & Gamble**
20	**Westinghouse Electric**
21	**Union Carbide**
22	**Tenneco**
23	**Goodyear Tire & Rubber**
24	**International Harvester**
25	**Occidental Petroleum**
26	**Phillips Petroleum**
27	**Union Oil of California**
28	**Bethlehem Steel**
29	**Caterpillar Tractor**
30	**Eastman Kodak**
31	**Rockwell International**
32	**Dow Chemical**
33	**Kraftco**
34	**RCA**
35	**Esmark**
36	**Sun Oil**
37	**LTV**
38	**Beatrice Foods**
39	**Xerox**
40	**United Technologies**
41	**Greyhound**
42	**Firestone Tire & Rubber**
43	**Boeing**
44	**General Foods**
45	**Ashland Oil**
46	**Monsanto**
47	**W. R. Grace**
48	**R. J. Reynolds Industries**
49	**Litton Industries**
50	**Lockheed Aircraft**

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Food Marts Called Not Immune to Hardware Threats

By Toni Wiseman
Of the CW Staff

DENVER – Supermarkets are no less susceptible to hardware catastrophes than any other business, Edward Devlin told the Super Market Institute's (SMI) annual DP conference last week.

"You may not be getting bomb threats in your installations because you are in a low profile industry – food – but don't think it couldn't happen, because it has," the senior partner of Devlin Associates said to startle attendees into thinking about disaster recovery plans.

"Everyday you have frequent short-term problems, such as software bugs or hardware failures or even power outages. Here the DP manager should have latitude to do his own thing," Devlin said.

"But what about the long-term problem? That's the kind of thing you have to prepare for and prepare for now," Devlin added.

Man-made disasters are more frequent than natural ones, though even man-made ones are less frequent now than in the past when dissidents were bombing computer installations, he noted.

The possibility of a fire starting in a DP center is something like 10^2 and of a plane landing on the center is 10^4, but these disasters have occurred and every installation should have a documented recovery plan which is available for training review and updating, he maintained.

Disaster Recovery Plans

"Industry is creating the need for disaster recovery plans," Devlin asserted. "The DP manager now tells his management what will happen tomorrow and next year. The corporation is totally dependent on you."

Suppose, he suggested, a user's computer center was destroyed, the building became inaccessible and remained so for a whole week and a number of the third-shift operators were injured during the disaster.

How would the user notify everyone? Reconstruct the data? Continue temporary processing over an extended period of time? Rebuild and/or reequip his data center? he asked.

"If you can answer these four questions, you have a disaster recovery plan," Devlin told attendees.

The plan must determine who will be notified, by whom and how, he said. "It's no good to say someone will be responsible for all notification if that person was one of those injured."

User departments may have to supply data to reconstruct lost files and will certainly need to be alerted that processing may be delayed, he said. Restoring and reconstructing data is a critical area, he noted.

"Hopefully all critical files are backed up off-site, so restoring from backup tapes to disks is not a difficult task. But what about reconstructing lost data?" he asked.

Many centers operate on a son/father/grandfather system, usually with the son and father files on site and the grandfather files off-site.

"If the user department is in the same building as your DP center, you may not be able to get the hard copy you need to reconstruct your files, so what do you do then?" he queried.

"And," Devlin added, "before you can start processing current data, you've got to reconstruct all the past data. How much processing time can you get at your backup site for reconstruction before you fall hopelessly behind in current processing?"

CW
At SMI

"Multiple backup sites may be necessary and that isn't easy," he said.

Management must then decide which are its critical applications, what supplies are needed to process them and how transportation support will be coordinated, Devlin averred.

"For every application, you have to ask yourself if you can rebuild it from what you have stored off-site. This means you have to know every possible input and where it comes from," he said.

Finally, there is the area of the new data center. A disaster recovery plan should include space requirements, including space for tape libraries, programmers and supplies; power needs; air conditioning, heat and humidity controls; communications; and furniture, supplies and equipment requirements, he stated.

New York Resumes Lottery With Revamped DP

(Continued from Page 1)

the spokeswoman said.

The state lost about \$27.1 million as a result of the halt in lottery operations in its 1975-1976 fiscal year and another comparable amount predicted for the first half of the 1977 fiscal year, a spokesman for the governor said.

In order to get started with the least amount of delay, the lottery commission bought time from the state's Office of General Service's Computer Division, according to Monitto.

A 2M-byte IBM 370/168 CPU is utilized there for all ticket accounting and management reporting functions.

This system, however, is not being used to print the algorithm-generated six-digit numbers that caused the lottery's problems last year, he noted.

Instead, the lottery commission is presently playing it safe, using simple dollar amounts or the word "jackpot" in each box, according to Monitto.

The weekly game with computer-generated numbers, slated to begin in November, will be heavily supervised. "All kinds of precautions have been taken," the spokeswoman stressed.

At the end of last week, the lottery commission had not released information concerning the design of the algorithm used to specify numbers printed on tickets or the number of digits for the future weekly games, she said.

The next step will be to acquire a CPU solely for the use of the lottery in keeping with the reorganization plan suggested by the ADL study, Monitto said.

That in-house system will generate numerical ticket control information, including ticket numbers and dates, on magnetic tapes, he said.

The tapes will be manually carried to two Mohawk Data Sciences Corp. MDS 2400 systems for the printing of numbers on lottery tickets from ticket stock presently supplied and designed by Moore Business Forms, Inc., he explained.

The biggest job the system will have to handle will be printing the weekly lottery tickets – a job that is expected to take 10 to 12 hours each day on the two MDS systems, he remarked.

The lottery is in a trial period from system start-up until the end of the state fiscal year next March, he said.

It has to net \$60 million to break even on the budget amount allocated by the state, Monitto said.

In its first week of operation, the lottery commission sold 18.9 million tickets, setting a national record. "It looks like we'll make it without any trouble," Monitto said.

The state Bureau of the Budget will be "keeping an eye on" the lottery computer system through its DP unit, an office empowered to supervise all DP and computer processing statewide, Monitto noted.

The lottery's overseers are in the process of arranging for construction of a new facility here to house the game's 200 employees and the DP system under one roof, Monitto said.

Construction will begin after the present CPU procurement effort is completed.

IBM Data Entry Gear Reduced

(Continued from Page 1)

equipment as punch card units, control units, printers, keyboards, verifiers, data stations and arithmetic units, were the result of "a normal business review" prompted by "current economic trends," he said.

There were no "technological implications in this announcement," he added.

Active products reduced in price were the 026 interpreting card punch, 029 card punch, 047 tape-to-card printing punch, 059 card verifier, 129 card data recorder, 545 output punch, 1058 printing card punch, 2495 tape cartridge reader, 3715 printer, 3717 printer, 3741 data station, 3742 dual data station and 3747 data converter.

Of the active products, only the 3700 series models are in new production, the spokesman added. The other equipment is supplied "as new" and may be reconditioned from units turned in by users.

Representative of the price cuts are the 029 Model A-22 card punch, which was \$3,685 and now costs \$2,765; the 129 Model 001 data recorder, which was priced at \$6,485 and now costs \$4,865; the 3741 Model 001 data station, which cost \$6,235 and is now priced at \$4,680; the 3742 Model 001 dual data station, which sold at \$7,225 and now costs \$5,420; and the 3741, which was reduced from \$19,330 to \$14,500.

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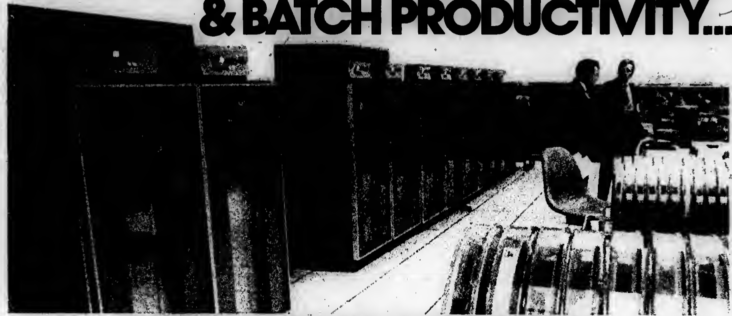

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FEATURES

DICTIONARY DATA SET for on-line storage of application/display parameters

ALTERNATIVE FIXED-FORMAT DISPLAYS with:
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User-specified field selection

USER EXITS for special processing and data base access

MULTIPLE DATA SET DISPLAYS on a single screen

FULL BROWSING/UPDATING support for DAM, ISAM and VSAM files

INPUT DATA VALIDATION/OUTPUT DATA EDIT

MULTIPLE SECURITY LEVELS on:
Overall application level
Selective password level
Individual field level

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DISK MANAGEMENT SYSTEM

DFAST/VS DYNAMICALLY ALLOCATES DISK-SPACE FOR ALL FILES ON DEMAND

ADVANTAGES

Eliminates need for separate work areas per partition

Provides full PSM (Public Space Management) facilities across pack boundaries

Provides full scheduling flexibility

Increases file security thru password protection & ENQUE/DEQUE

Increases available space by 15-35%

Allows complete space sharing between CPUs and partitions

Eliminates 'overlap' and 'duplicate file-ID' conditions/messages

Makes disk JCL:
Partition independent
Disk-type independent
Disk-address independent
Starting-track independent

FEATURES

Uses standard IBM JCL

Dynamic space allocation for ISAM, SD, and DA files

Automatic truncation of unused file space

AVR (Automatic Volume Recognition)

Operates in the SVA

Supports user, partition, and system standard labels

Disk utilization and audit-trail reports

CPU and partition-sensitive labels

LOCK/UNLOCK and ENQUE/DEQUE file commands

Device independent open

SORTIN/SORTOUT in same area

TFAST/VS

TAPE MANAGEMENT SYSTEM

PROVIDES AUTOMATIC FILE/CYCLE VERIFICATION AND TAPE LIBRARY REPORTS

ADVANTAGES

Shares drives between partitions

Prevents acceptance of wrong cycle input

Protects non-expired files from accidental scratching

Produces automatic library reports

No re-organization of library necessary

Release independent—no transient modifications

No limit to number of cycles retained

FEATURES

Utilizes IBM standard 17 character data set names

Automatic volume recognition (AVR) thru DSN catalog

Retention by days or cycles or both

Supports physical IOCS OPEN CLOSE (ditto, 1400)

Operates in the SVA

Dual CPU support

Supports rotating data set pools

Complete COBOL library reporting system

Controls unlabeled tapes

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SAVE/RESTORE PROVIDES SELECTIVE, HIGH SPEED BACK-UP FOR ALL FILES AND LIBRARIES.

ADVANTAGES

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FEATURES

Disk-type independent (2311, 2314, 3330, 3340, 3344, 3350)

Libraries/files may be transferred between different disk-types and locations

Operations may be either disk-to-tape or disk-disk

High-speed library condense

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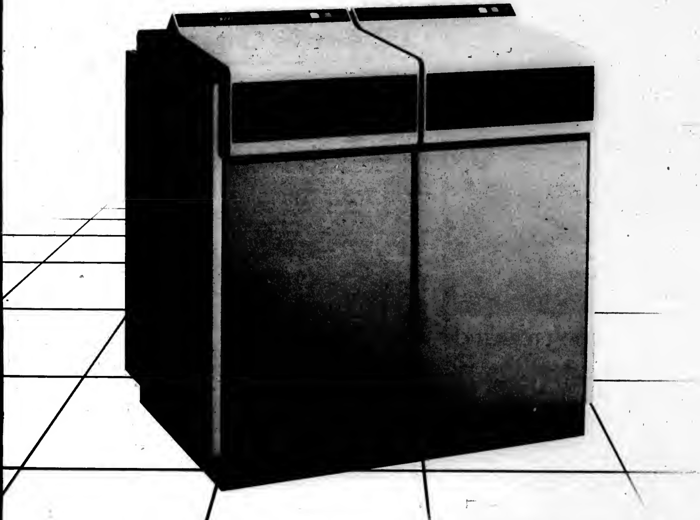

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Bell System Not Pacesetter in Low-Speed Modem Area

(Continued from Page 1)

offering the 103 below cost strictly as a reaction to its competitors.

The price on the 103 was made permanent in 1971, when Bell installed the first 113 data sets. The 113 was considered the first major modem meant to react to independent data sets.

One serious problem with the 103 was that it had no "port security" feature. This meant that during a disconnect sequence, it was possible for a second modem to connect to a line before the first modem had "timed out."

Since much of the 300 bit/sec data traffic involved time-sharing operations, this 103 deficiency meant unauthorized third parties could access computers, perhaps without the owners' knowledge.

Although the 103 is no longer generally available, this deficiency was never corrected and is also technically possible in the newer 113, according to an industry expert. The independent modems provide intelligence and logic so this problem cannot occur.

1,200 Bit/Sec Area

In the 1,200 bit/sec area, the independents offered features that improved on the Bell 201A dial-up data set and 201B private-line data set. Several independent modems could operate on both dial-up and private lines and Bell later offered the 201C, which also had this dual capability.

Bell reacted to the 1,200 bit/sec modems of the independents by bringing out a series of LSI versions in 1974 to replace its earlier 202 modems. The LSI models were smaller, less costly to build and offered some of the test indicators pioneered by the independents.

Early in 1973, Vadic Corp. began to install a modem that allowed full-duplex operation over two-wire facilities at 1,200 bit/sec. This modem, the first to offer users a full-duplex (two-way) transmission capability over only two wires, let users move the same amount of data over half the number of lines previously required.

This feature, introduced in the Vadic VA3400, is still not available from the Bell System today. After the Vadic introduction, Bell said it was working on a similar modem at Bell Laboratories, and an early version was reportedly shown to prospective customers but not introduced.

The Vadic modem suggested the possibility that the Bell System could supply customers with equipment not provided by Western Electric, its manufacturing affiliate. AT&T took some steps in this direction more than a year ago when it set up its General Trades and Purchased Products groups.

Each independent supplier admits these Bell groups have evaluated several of their modems for possible Bell System use. Beyond this evaluation process, however, Bell has yet to sign a major contract for an independent supplier to provide data sets to a Bell System company.

Most of the independents would welcome such an opportunity; several spokesmen have freely admitted they would be pleased to make modifications to their equipment if this were necessary to gain acceptance by the Bell System. Although some independents have supplied modems to independent (non-Bell System) telephone companies, AT&T has yet to approve such devices.

The evolution of 2,400 bit/sec modems covered the same type of pattern as the lower speed devices, but Bell has not reacted with a new series in the area.

Independent 'Firsts'

In all cases where Bell introduced modems to react to the independent suppliers, the modems offered features that first appeared elsewhere. The trend toward giving tha customer more test capability – and thus greater control – over his data communications system was introduced by the independents. This led to decreased dependence on Bell maintenance men to solve problems and probably increased the amount of time modems and lines were operational.

The independents also were first to offer users the ability to test multiple modem locations on multipoint private-line networks. With this capability, testing could be done at many sites without having an operator at each location.

A third feature was the sharing of terminal devices. This made it possible for several terminals to share one modem. Bell did not offer this until less than a year ago.

Another area in which the independents broke ground was the use of modem-type line adapters which allow users to transmit data over wires without going through telephone company central office facilities. General Electric reportedly pioneered this type of device, but other early suppliers were Computer Transmission Corp., Prentice Electronics and Gandalf Data Communications Ltd.

These line adapters allowed users to transmit data over so-called metallic wire connections. While Bell has never offered this type of device, it has issued specifications that detail the kind of electrical signals that can be sent over metallic connections.

The achievements of the independent suppliers were clearly an outgrowth of the Federal Communications Commission's (FCC) ruling in the Carterfona case which said noncarrier-supplied equipment could be connected to the phone system.

Without this decision and subsequent FCC pro-competition rulings, the independent data communications suppliers would never have been allowed to exist, and customers would have been denied many of the devices and features which the Bell System companies introduced as competitive reactions to other vendors.

If the Consumer Communications Reform Act of 1976 is passed in a form that eliminates this competition, it is conceivable that innovative equipment introductions for data communications users would be greatly diminished and perhaps eliminated completely.

Because the independent suppliers are also the major source of modems that are incorporated into communications terminals, this segment of the industry would also disappear if the Reform Act became law. This would happen because Western Electric equipment is prohibited by regulatory and antitrust constraints from being supplied to noncarrier companies.

FEC Unveils Campaign Turnkey

(Continued from Page 1)

To demonstrate the capabilities of its system and to get these services under way, the commission issued its first computerized, consolidated campaign finance report on Presidential candidates last week as well.

That report indicated a total of $77,875,647 was reported as campaign expenditures by all Presidential candidates during the January 1975 to August 1976 primary and prenomination period.

The 126-page printout indicated democratic candidates and their campaign committees reported $42,408,755 in receipts and $42,806,339 in total expenditures. Republican candidates and their campaign committees reported $32,475,977 in receipts and $29,986,245 in total expenditures.

Other candidates reported $660,632 in receipts and $772,228 in total expenditures in those 20 months.

While the figures also need to be verified by FEC audit, they do provide an indication of the total flow of money in the campaign, the commissioner said.

The first in what will be called the "FEC Disclosure Series," this report on Presidential prenomination receipts and expenditures for the 1976 campaign will be followed by similar reports on the financial activity of multicandidate special interest groups, on contributors to the Presidential campaign and on congressional campaigns.

At the beginning of April, Interactive Sciences Corp. (ISC) of Braintree, Mass., was selected to develop the necessary software and to acquire the system hardware.

The FEC is today renting a portion – 25% – of ISC's mainframe, a Digital Equipment Corp. Decsystem-10. ISC considers the system it constructed for the commission neither conventional time-sharing nor facilities management system, according to Alfred H. Jorgensen, an ISC senior vice-president.

The slow-speed, 1,200 bit/sec communications portion of the system relies on a DEC PDP-8 and on a Modular Computer Corp. (Modcomp) system.

For higher speeds, the system has Mohawk Data Sciences Corp. 2,400 bit/sec gear, Jorgensen said.

The rest of the communications system consists of two leased 9,600 bit/sec lines and data sets from AT&T and a Timeplex, Inc. multiplexer.

As for terminals, the FEC has 10 CRTs – Applied Digital Data Systems (Adds) 580s – and two Decwriter LA 36 printers. These are handled by one of the Bell telephone lines. The other line is connected to a 600 line/min Data 100 printer.

The entire system is costing the FEC about $500,000 for one year; approximately $300,000 is going toward equipment rental, Jorgensen said.

Sicob Opens in Midst Of Industry Quandry

(Continued from Page 1)

direct support to computer users to aid them in developing applications.

To date, most government support has gone to Compagnie Internationale pour l'Informatique-Honeywell Bull, the country's largest domestic mainframe maker. However, the government had planned to announce a major new program of support for both the peripherals industry and the minicomputer field at Sicob.

The plan would have called for the combination of several of the smaller peripherals companies into one new firm that would have received heavy government research funding as well as preferential purchasing.

The plan also would have called for increased spending in the minicomputer area, sources said.

Meanwhile, Sicob, with more than five floors of displays, opened in what most exhibitors described as an optimistic mood. American firms such as IBM, Data General, Burroughs, Computer Machinery Corp. and Telex will be strengthened if the government reduces its support to the French competitors here and so were out in force for the two-week show, expected to attract 300,000 visitors from over 100 countries.

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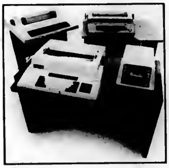

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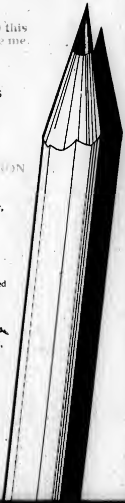

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1970 Report Foresaw Shakeouts

IBM Couldn't Pinpoint Software Industry's Vitality

By Molly Upton
Of the CW Staff

NEW YORK – Despite a "user population which does not yet know what its needs are," the software industry was apparently booming in 1970 in the wake of IBM's 1969 unbundling announcement, according to a report by IBM's Market Evaluation Department entered into evidence by the Justice Department in the U.S. vs. IBM antitrust trial.

Given the task of analyzing this somewhat amorphous, newborn phenomenon, the group concluded there were indeed possibilities for long-term growth, but there would be numerous shakeouts in the near term.

The writers of the study seemed unable, however, to pin down what the software industry was and where it was going because there were few patterns to be discerned.

"At this point in the history of software, we can detect no valid reason for drawing a pessimistic conclusion regarding the industry's future," the report said.

"So, although there is insufficient evidence to warrant the unrestrained optimism voiced by industry adherents, it is our judgment that the opportunities which are available will motivate independent software companies to find a profitable avenue – over the long haul," the report said.

"However, in the short term, there are so many pitfalls that numerous software companies will find the course too difficult. The survivors will be much fewer, much larger and more diversified than the industry is today," the report predicted.

Rather than being a hard-hitting report on a specific industry, the study lamented the "elusive" progress "software companies have made during the 1960s.

IBM Trial Documents

"Not only is it difficult to determine what is software and what is not, but even after one settles this dilemma (if only in his own mind), there does not appear to be any unanimity of overall direction, product scope or corporate emphasis."

The study defined software companies as those "which derive a major share of their revenues from consulting services, programming services or program products.

"Therefore, it is not at all surprising to find wide – and often unexplainable – variations in the financial performance of the companies in the software industry," the report continued.

"However, more critical to an evaluation of the future financial course of software companies is the fact that we have been unable to detect any significant characteristic in the histories of these companies which would enable us to determine the direction they might take in their quest for lucrative financial results," the group admitted.

The report outlined factors that might constrain growth as well as those that could prove to be opportunities.

In attempting to grapple with the industry, the report said "the almost unrestrained optimism with which the industry awaited IBM's [unbundling] announcement and the questioning and lingering doubts which have prevailed since June 23 give further credence to the judgment that the industry does not yet know where it is going or what the user wants.

"In this environment the independent software company, small or large, will have to deal with factors tending to constrain business growth":

- "The self-sufficiency concept" which indicates users are inclined to build up their own inhouse staffs.
- An "auto buying syndrome" or tendency to buy from one source, such as the mainframe manufacturer.
- "Need for manufacturers' documentation" which would necessitate a delay before others can develop a complementary or competitive product.
- The history of "for sale" packages.
- "Unknown cost of marketing proprietary products" – not much more than 5% of the firms have a professional marketing person.
- "Insufficient product support" by some could harm the industry's reputation.
- Long-term payback inherent in software development.

Software products have a heavier initial investment relative to sales price than do mainframes, the report said.

Also, vendors have to make most of their capital investment prior to shipping. The possible trend toward monthly leases, following mainframes, would further extend the time between investment and realization of income, the report indicated.

(Continued on Page 10)

Software Predictions Off?

NEW YORK – IBM market evaluators predicted in 1970 that Applied Data Research, Inc. (ADR) would not be one of the top survivors in the software industry.

The evaluators examined the financial pictures of ADR, Computer Applications, Inc., Computing and Software, Inc. (CAS), Computer Sciences Corp. (CSC) and Computer Usage Co. (CUC), according to their report, filed as evidence by the Justice Department in the U.S. vs. IBM antitrust trial here.

The IBM team selected CAS as having by far the best chance for survival or success. Second place went to CSC which, after a large gap, was followed by ADR, Computer Applications and CUC.

In explaining this selection, the report indicated CSC was heavily involved with U.S. government contracts and labeled its efforts to provide commercial services by means of a heavy investment in Infonet as a "high-risk plan."

ADR's "limited product line," Computer Applications' "troubles with Speedata and generally poor plan for growth" and CUC's "program misfortunes, management problems and staff losses" gave "little reason for forecasting bright futures for them," the report said.

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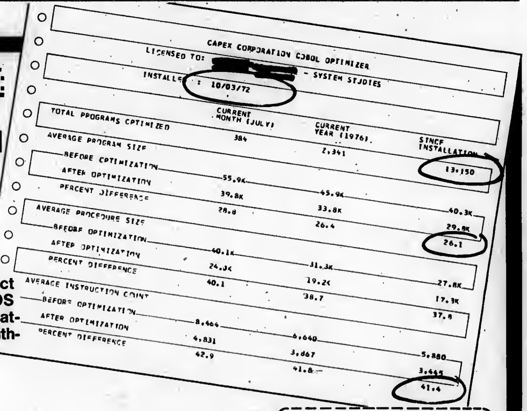

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AVERAGE PROCEDURE SIZE
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 PERCENT DIFFERENCE             40.1             38.7            37.8
AVERAGE INSTRUCTION COUNT
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Seattle City Council in Midst of $1 Million DP Snafu

By Don Leavitt
Of the CW Staff

SEATTLE – The City Council here is caught in the middle of a million-dollar hassle involving two of its own departments, at least two outside consulting groups and a major DP project that is late, incomplete and already well above budget.

When first envisioned in late 1972 and early 1973, the Integrated Financial System (IFS) was to be a set of related applications, all of which tied back to a central Budget Control System. The software could be all ready by 1975 for a cost of about $384,000, the planners estimated.

To date, the budget system has been implemented and is finally in production mode after well over a year of faulty operation and a shift, involving conversion work, from one computer center to another. The other applications have been designed but apparently not programmed, awaiting a go/no-go decision from the council.

The cost of the project has apparently reached $1.45 million. Various officials were quick to point out, however, that total includes substantial amounts – on the order of $35,000/mo during 1975 and early 1976 – for time at a commercial data center.

The outside time was required because the city failed to decide what equipment it wanted for its own facilities, a decision that had been expected to take place in 1974 or 1975.

The cost has been inflated also by the city's inability to supply as much staff support to the two contractors as had been originally expected, largely because the city didn't have the expertise available. At least some of this manpower was supplied by one of the contractors for a price.

Changes in design have added their cost to the development effort but, in fact, the cost of creating the base system has not been overrun nearly as much as the gross cost of developing and running it to date would make it seem, according to Gary Roats of Touche-Ross, the system design contractor.

With headlines such as "The Computer That Didn't;" the local general press is having a field day reporting the day-to-day status of the IFS project. Various factions advocate continuing development of the system, scrapping it completely and, somewhere in between those two extremes, retaining what has been installed and using it as a base to build a less ambitious system.

Estimates on how much of the project has been completed vary. The IFS supporters note the budget system is the kingpin; it is operational; the overall design has been somewhat curtailed from its original all-encompassing scope; and the interfaces between budget and the other applications are well understood.

With that assessment of the situation, they see the project as already 60% complete.

Opponents of IFS have a different, darker view. Even if the design was good, the programming – done under contract by Boeing Computer Services – was rushed once the go-ahead was made in the fall of 1974 and was clearly full of problems, as evidenced by the year or more it took to get the budget system to work properly.

The additional applications haven't been programmed yet and the cutback in the scope of the project is no reason to claim a higher percentage of completion than if the initial plans were still in place, they noted.

"About 20%" seemed to be their estimate of how much of the system was finished.

The future of the system is intimately tied into how Seattle decides to handle its overall DP needs from now on. Having failed to decide on an appropriate in-house configuration for installation in 1975, the city put the budget system up on the IBM 370/155 at Boeing Computer Services.

The cost of that operation led Seattle to move the programs to the King County data center, also utilizing a 155. But there appear to be serious questions about the capacity of that hardware to successfully support the workloads of both the city and the county.

That situation suffers, as well, from dual city/county managements that often compete with each other for system resources, according to a set of status reports prepared last month by the city's Office of Management and Budget/Management Information Services, which took control of the IFS project in mid-1975 and advocated continuing development based on the "good sound" design already specified.

These reports advocated establishing a separate computer facility as soon as possible.

IBM Couldn't Pinpoint Software Scene

(Continued from Page 9)

- "Scarcity and mobility of personnel."
- "Lack of experienced management."

But there are opportunities for the independent software firm, the IBM group said. It can:

- "Fill areas abdicated by the manufacturers" such as detailed program coding or management consulting – "a function the manufacturer's representative may be forced to abdicate or reduce because of his lack of systems manpower."
- "Provide continued support for superceded software."
- "Utilize [its] unique know-how to provide answers for specialized applications."
- "Capitalize on the comparative freedom from standards and documentation practices to react quickly," i.e., lack of red tape.

The report also cited a couple of additional factors it saw contributing to long-term growth. One of these was the overwhelming popular opinion that business would expand through the '70s and, in some cases, well into the '80s.

"But in the short term a downturn in the national economy, cutbacks in government spending [and] a need for more experienced management, together with the marketing, financial and personnel constraints generally prevalent in the industry, will result in lost identity for many software companies," the report added.

"Some of these companies will simply go out of business; others will be swallowed up by larger and more stable competitors; and a few will be acquired by their principal customer – the user," the report predicted.

In attempting to detect a pattern, the report writers asked, "Does such an industry even exist?"

Even with its definition of the industry, it found only 12 companies with revenues of $6 million or more in the latest calendar or fiscal year in an industry comprised of 2,000 to 3,000 individual enterprises, most of which were not large or mature enough to allow a valid industry assessment, the report indicated.

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For Industry, Commerce and Home

Energy Conservation Seen as Major DP Application

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – Computers can help save energy for the U.S. initially in industrial and commercial applications, but eventually in individual homes as well, according to Brian Travis of EMS/Datrix Corp.

Speaking at Compcon '76, the IEEE Computer Society's 13th International Conference held here recently, Travis and Mike Chidester of IBM agreed energy conservation is a major new application for the computer industry.

"Reduced energy consumption has been clearly established as a national priority," Travis said, adding energy management systems cannot only offer assistance in achieving this priority but in reaching its related goals – minimizing energy costs and ensuring energy availability.

Computers can help industrial and commercial users reduce their energy consumption by 20% to 30%, he noted. From the industry's viewpoint, this application area will represent a $10 billion annual market by the fourth quarter of 1977.

The key to reducing consumption is to "optimize a facility's load profile," Travis said, referring to what time of the day or week and in what quantities the facility uses energy. The idea is to minimize the peaks in the demand for energy that now tend to be placed on utilities, particularly those providing electric power.

Large computer networks are required for energy modeling of specific industrial and commercial facilities because energy analysis programs tend to be large, expensive and complex and to require significant amounts of runtime, Travis said.

Minis and Micros

Once a facility's energy usage has been profiled, however, minicomputers and even microcomputers can monitor and optimize the scheduling of energy consumption within a facility and provide improved environmental control at the same time, Travis explained.

These smaller computers rely on the data base created by the modeling exercise. A user can recover the cost of modeling his facility's load profile in less than a year through the energy savings gained alone, he maintained.

But, he added, industrial and commercial consumers will require additional price incentives to move in the direction of energy conservation.

Energy conservation is the only System 7 application area for which IBM has created a separate marketing organization. That organization consists of a special marketing group which is part of the General Systems Division in Atlanta, Chidester said.

In addition, there is a 16-person service, programming and development staff working on this area alone in San Jose, Calif.

Companion Senate Bills

There are currently companion bills before the U.S. Senate, S. 3310 and S. 3311, that would force the utilities to balance loads better by changing their rates, Travis noted.

The utilities and their users are already moving in this direction, however, and don't require government intervention, he said.

Not only industrial and commercial facilities, but residential power consumers as well are thinking along these lines, he added.

"The electric utility industry would much prefer to have dishwashers and electric hot-water heaters that only operate during the utility's off-peak demand periods.

"They would also prefer to have refrigerators with storage compartments to create and hold excess heat when the consumer's air-conditioning system is functioning at peak operation," Travis stated.

All this requires intelligent control, he observed. Citing the growing acceptance of microprocessor units in home entertainment centers and microwave ovens, he suggested computers will eventually be used in home energy conservation as easily and as often as they are starting to be used in industrial and commercial applications.

Working with concepts very similar to those used at Datrix, IBM's Power Management System, based on a System/7, is intended "to lower the dollar amount of the bottom line of the energy bill and to create more-effective utilization of electrical power at all levels of demand," according to Chidester.

Once again, the goal is to reduce the total energy curve for an industrial or commercial facility throughout a 24-hour period.

While an intelligent device – the computer – is used to reduce demand, it must be programmed to do so without interrupting the production of the user's people or affecting their comfort or creating a safety hazard, Chidester said.

Accordingly, a survey is made of the "manageable" devices in the facility, he explained, adding these devices are put in a list indicating the priorities in which they are to be controlled.

These devices are controlled by a system working in conversational mode – in English – with its operator at all times, thus eliminating the need for a trained computer operator, Chidester noted.

Before installing any conservation device, however, he advised those who would minimize their energy usage to take an inventory of the energy consuming devices in their facility, to learn how their facility uses energy, to develop a control strategy and to compare the gross dollar savings with the installation costs.

Chidester cited statistics from his corporation that support Travis' comments that this computer application is growing.

Between 1973 and the end of 1975, IBM installed some 400 power management systems; between January 1 and July of this year, the company added another 200 installations to this base.

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Fernbach, Fuller Clash

Mini vs. Maxi Debate Stirs Discussion of DP Future

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – Which statement do you believe?

- "Maxi" computing at one centralized location is here to stay because large problems require lots of computing power and big systems offer the mix of services needed to solve them.
- "Mini" computing in distributed fashion offers cost/performance, modularity and reliability advantages over large-scale, centralized computing and will eventually supersede maxis.

These were the positions taken by Dr. Sydney Fernbach of Lawrence Livermore Laboratory and Dr. Samuel Fuller of Carnegie-Mellon University respectively at a debate held here recently during the IEEE Computer Society's Compcon '76.

Even if distributed processing does take over, "large systems will be required to link any large group of minicomputers together," Fernbach said.

Maxis will be kept in business in their own right because there are "tremendous needs in this country and the world for large and very large computers," he argued.

Problems Keep Growing

The already large problems continue to grow – be they in plasma physics, social security, traffic control or the economy – and the models required to understand them are increasingly more complex, Fernbach stated.

Real time becomes involved because those trying to solve these problems find turnaround time to be important. Without short response times from a computer system, years would be required to build a model or to develop a solution to a problem, he said.

The segmentation of some of these problems is very difficult, Fernbach added. Any one language doesn't easily permit this, but large general-purpose computers provide extensive language capabilities that are easy to access at the same time. This assists in chopping problems up into manageable pieces, he said.

Large computers are more cost-effective, Fernbach argued further. "The bigger the memory, the better," he said, adding memory and software, the two greatest costs of any computer system, tend to cost less in a large system.

A group of minis will require the same group of peripherals needed on a large machine, so there isn't any cost reduction there, Fernbach noted.

Fuller agreed the cost effectiveness for minis was about the same compared to that of maxis until memory costs began to drop at the beginning of 1975.

The Carnegie-Mellon professor maintained the computer industry will see many more distributed systems in the years ahead. There aren't more now because a "nontrivial" amount of engineering work remains to be done, he said, adding the technology and the "breakthroughs" in distributed processing have already been accomplished.

Relying on his own work with a system made up of 16 Digital Equipment Corp. PDP-11s and called "C.MMP," Fuller said only a negligible amount of degradation of memory ever occurs because these processors share it.

Degradations of no more than 5% to 10% in performance measured in response time have resulted from C.MMP's distribution of processing tasks. Many predicted this degradation would occur by a factor of 2 to 3 prior to the Carnegie-Mellon work, Fuller stated.

Problems can be decomposed to run on multiminis, he said. In addition, Fuller noted he views the decomposition of problems as the central issue on which minis vs. maxis will rise or fall.

"At Carnegie-Mellon, we have shown linear speedup or encouraging speedup in the decomposition and the solution of traditionally complex problems," he said.

"Remember we are talking about a multimini that is twice as powerful as an IBM 370/168," Fuller said, referring to C.MMP.

"The killing thing on the PDP-11 is its small language space. We spend less time decomposing problems and more time shoehorning problems into the small address space of the PDP-11," he added.

Fuller agreed there is work to be done in the area of reliability in distributed processing. The diagnostic problems and the difficulties involved in providing adequate communications between the modules of the system are key, he said, noting the work with C.MMP has yet to delve deeply into these areas.

Despite the "engineering problems" distributed processing continues to pose, it is affordable and its features make it attractive to those who wish to distribute their processing on a geographic basis or who are interested in networking, according to J. Robert Wood of IBM's Federal Systems Division, who chaired the debate.

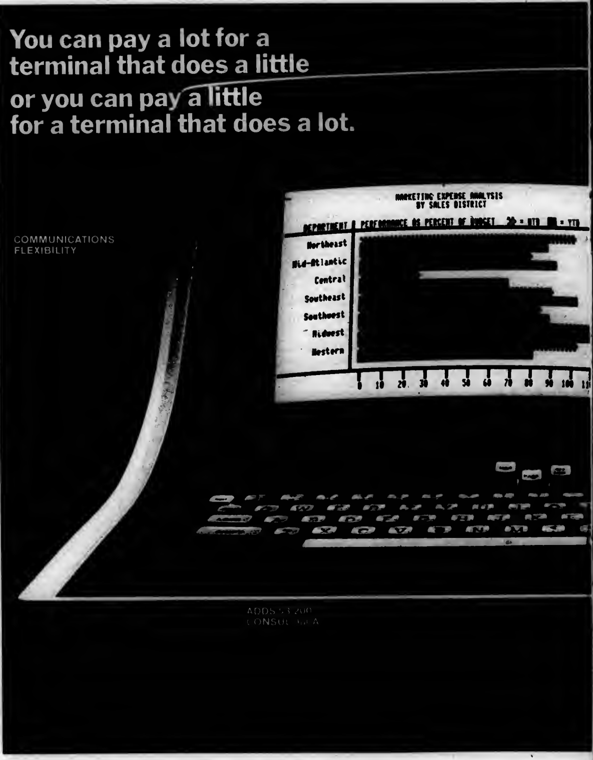
Privacy Unit Plans Hearings on Schools

LOS ANGELES – The Privacy Protection Study Commission will hold public hearings here on the recordkeeping practices of educational institutions on Oct. 7-8.

The hearings, which will consider protections afforded the personal data of elementary, secondary and postsecondary school students by the 1974 Family Educational Rights and Privacy Act, will be held in Room 8544 of the Federal Building at 300 N. Los Angeles St.

The commission is seeking testimony on four types of recordkeeping systems maintained by educational institutions: education records; medical records; law enforcement records; directory information; and research records and "desk drawer" notes.

Those interested in assisting the commission should contact its executive director, Carole Parsons, in writing at Suite 424, 2120 L St. N.W., Washington, D.C. 20506.



System Design During Development Called Reasonable

By Don Leavitt
Of the CW Staff

LONDON – System design – especially for large projects – may well be impossible to complete before development work begins, but that is quite reasonable as long as an installation has an orderly plan by which it can control completion of the design as the project moves along, according to Fergus O'Brien of PA International Management Consultants Ltd.

"System design is the main transformation between the user specification and the detailed computer-oriented specifications," O'Brien explained at the recent European Computing Congress here.

The design has two functions – to show how the user's needs will be fulfilled and to show the computer implementation is feasible, he added.

The first of these functions often has its own problems, he said, explaining that, for example, "a user requirement such as 'ease of use' cannot be said to be defined in a completely meaningful way."

But if the designer is willing to accept specifications that are "necessarily incomplete," work can go forward even on projects involving more than 100 man-years of software effort, he told his listeners at a session on software engineering.

Changeable Ambition Levels

Control must start right in the initial system design phase or the base for continuous development is gone, O'Brien said. This means the designer must be sure to include various system-specific concerns even though the user's specifications focus on his application needs.

"Operator interfaces, recovery and standby [procedures] are deferred to one's peril," he cautioned.

Perhaps even more important, he added, is to design a system with a "changeable ambition level." The technique is to construct the design as a series of subsets of increasing ambition level so omission of a highly ambitious feature "can be contemplated without recrimination."

Properly done, this could lay the groundwork for a series of releases which enhances the project rather than the all-too common series of releases needed to catch up with a design that was too ambitious and had to be torn apart to make it work, O'Brien said.

Once the project reaches the implementation phase – the most difficult of all, in O'Brien's view – the continuing control approach requires great changes in the usual staffing pattern.

'Guinea Pigs' Needed

In addition to a design control group to approve any changes before they become part of the system, O'Brien also sees the need for a design questions group – which tries to settle problems or work around them – and a group of "guinea pigs."

These guinea pigs, he explained, are some of the more advanced users of a new facility. They should be brought into the project at an early prerelease stage in order to contribute test cases and experience.

With such a group in place, the quality of products can be improved and the time span for development shortened. In the end, these users are also useful in training the groups from which they came, he noted.

The benefits of bringing the design groups and "guinea pigs" together are so substantial, he continued, it is feasible to consider writing substantial parts of the software twice during a project so all concerned gain a better understanding of what is needed.

Combining Two Tasks

The system integration phase can be modified, O'Brien suggested, so the two tasks of fault finding and fault correction are separated. It is the fault finder's job to make and preserve tests and to pass bad test results to the correctors, he said.

It is the latter group's job to correct the fault while still maintaining the system design as it developed during implementation. In this way, the most effective use is made of scarce resources – especially personnel – and, more importantly, design divergence is contained, O'Brien said.

The results of providing continuing, adaptable control in actual projects show productivity has more than doubled, code contains half the errors and projects now overrun to within a maximum 10% rather than 100%, he said, noting finally that "some projects are now coming through under budget."

Bike-Mounted Micro Monitors Exerciser

LOS ANGELES – These days a bicycle can not only relieve a person of several pounds of unattractive fat, it can also monitor his fitness level, calorie loss and heartbeat.

Based on a PPS-4/2 microcomputer from Rockwell International, the Dynavit monitoring bicycle accepts inputs of age, weight and sex to calculate a loading on the machine's pedals.

These three factors are punched in with a keyboard while the exerciser's heartbeat rate is fed into the system from a wristband sensor.

During 10 minutes of exercise, the microcomputer calculates the user's "health factor," a Dynavit number which is displayed on the machine.

The Dynavit number ranges from zero to 150. An average person who exercises periodically will score from 50 to 75, a more athletically inclined person will rate between 75 and 100 and a professional athlete should show above 100.

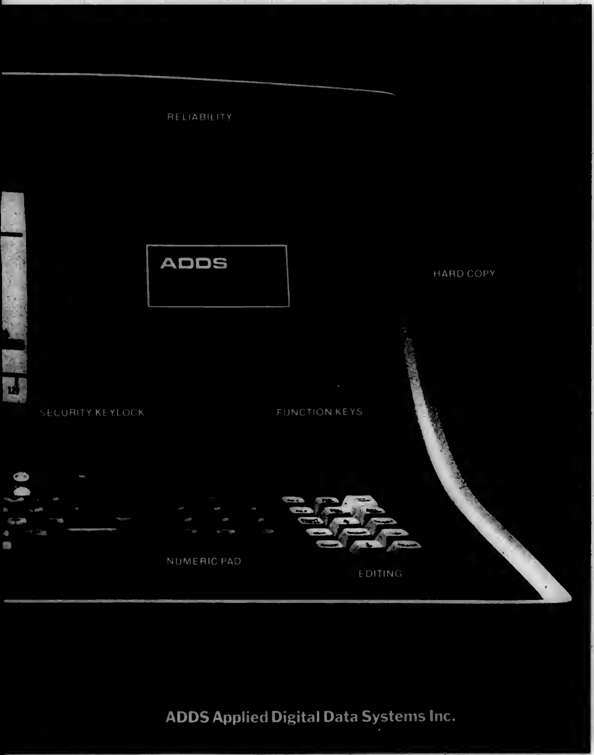
The microcomputer contains algorithms in its program memory which compare the monitored heart rate input with normal rates and flashes a green light that all is well.

If pulse rate becomes too rapid, a red light flashes, warning the user to either slow down, stop or reduce the pedal loading by pushing a button on the console.

The machine is also capable of calculating calorie loss during exercising and displaying the result.

Manufactured by the German firm Keiper, the bicycle should be available in the U.S. in about six months.

In Germany, the bike sells for about $900. It was publicly demonstrated for the first time in the U.S. at the recent Western Electronic Show and Convention (Wescon) here.



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Registration for CDP Test Open

CHICAGO – Registration for the 1977 Certificate in Data Processing (CDP) examination is now open, according to Fred Harris, president of the Institute for Certification of Computer Professionals (ICCP).

Registration forms and information are already in the hands of ICCP's constituent societies and mailings have been made to major user groups in business and academia, Harris said.

Besides the monetary and practical reasons for taking the exam, Harris cited the personal value gained from preparing for it – honing skills and filling gaps of knowledge.

The CDP examination was first offered in 1962. Since then, about 16,000 people have received CDP certificates.

The five-part exam covers equipment, programming and software, principles of management, quantitative methods and systems analysis and design.

Applicants may sit for one, several or all five sections; however, all five parts must be completed to receive the CDP.

The test is administered for ICCP by the Psychological Corp. of New York, an educational testing service.

Almost 38% of last year's examinees passed the test [CW, Sept. 13].

Additional information is available from the ICCP at 35 E. Wacker Drive, Chicago, 60601.

Societies/ User Groups

Calendar

Sept. 27-29, New York – **Minicomputer Applications**, sponsored by the American Institute of Industrial Engineers (AIIE). Contact: Department PR, AIIE Seminars, P.O. Box 25116, Los Angeles, Calif. 90025.

Sept. 28-30, Montreal – **Canadian Computer Show** Contact: Canadian Computer Show, 481 University Ave., Toronto, Canada M5W 1A7.

Sept. 29-Oct. 1, Chicago – **"Manufacturing Data Systems,"** sponsored by the American Institute of Industrial Engineers (AIIE). Contact: Dept. PR, AIIE Seminars, P.O. Box 25116, Los Angeles, Calif. 90025.

Sept. 29-Oct. 1, Madison, Wis. – **1976 Mumps Users' Group Meeting.** Contact: Dr. Joan Zimmerman, Mumps Users' Group, Biomedical Computer Laboratory, 700 S. Euclid Ave., St. Louis, Mo. 63110.

Oct. 3-6, Hartford, Conn. – **Forum 1976 Fall Conference** for Singer Information Systems users. Contact: Forum International, 4902 Tollview Drive, Rolling Meadows, Ill. 60008.

Oct. 5-7, New York – **Business Show '76.** Contact: Convention Management Association, P.O. Box 32, Carle Place, N.Y. 11514.

Oct. 6-7, Philadelphia – **Instrumentation and Computer Fair.** Contact: Robert E. Harar, executive director, Instrumentation and Computer Fair, 5012 Herzel Place, Beltsville, Md. 20705.

Oct. 10-16, Anaheim, Calif. – **27th Congress of the International Astronautical Federation.** Contact: American Institute of Aeronautics and Astronautics, 1290 Ave. of the Americas, New York, N.Y. 10019.

Oct. 12-13, Syracuse, N.Y. – **Syracuse University School of Computer and Information Science Symposium.** Contact: School of Computer and Information Science Office, 313 Link Hall, Syracuse University, Syracuse, N.Y. 13210.

Oct. 12-14, New Orleans – **Civil Engineering Program Applications 24th Semiannual Conference.** Contact: John H. Carman, conference chairman, P.O. Box 1532, Rockville, Md. 20850.

Oct. 13-15, San Francisco – **Second International Conference on Software Engineering.** Contact: Jean Sherman, IBM D63/026, 5600 Cottle Road, San Jose, Calif. 95193.

Oct. 18-22, Rio de Janeiro, Brazil – **IX National Data Processing Congress**, sponsored by the Brazilian Society of Computer Users (Sucesu). Contact: Raul Isiris, Sucesu, Rua do Resende, 37-60, Rio de Janeiro – RJ, Brazil.

Oct. 19, Los Angeles – **Western Systems Conference**, sponsored by the Association for Systems Management. Contact: Bob Dales, program chairman, Mattel, 5150 Rosecrans Ave., Hawthorne, Calif. 90250.

Oct. 19-21, San Francisco – **1976 Mini/Micro Computer Conference and Exposition.** Contact: Robert D. Rankin, 5544 E. La Palma Ave., Anaheim, Calif. 94807.

Oct. 19-21, Chicago – **Automated Inspection and Product Control Conference.** Contact: Dr. Keith E. McKee, IIT Research Institute, 10 W. 35th St., Chicago, Ill. 60616.

Oct. 24-27, Las Vegas – **Info/Expo '76**, sponsored by the Data Processing Management Association (DPMA). Contact: DPMA International Headquarters, 505 Busse Highway, Park Ridge, Ill. 60068.

Oct. 25-27, Houston – **17th Annual Symposium on Foundations of Computer Science.** Contact: Prof. Meera Blattner, Department of Mathematical Sciences, Rice University, Houston, Texas 77001.

Oct. 25-27, Tucson, Ariz. – **Frontiers in Education Conference**, sponsored by the Institute of Electrical and Electronics Engineers, Inc. Contact: Dr. G.R. Peterson, Electrical Engineering Department, University of Arizona, Tucson, Ariz. 85721.

Oct. 25-27, Toronto – **45th Management Conference of the Association of Data Processing Service Organizations (Adapso).** Contact: Adapso, 210 Summit Ave., Montvale, N.J. 07645.

Oct. 28, Toronto – **Canadian Association of Data Processing Service Organizations (Cadapso) Annual General Meeting.** Contact: Argyle Syndicate Ltd., Suite 301, 47 Colborne St., Toronto, Ont.

Oct. 28-30, Portland, Ore. – **1976 National Association of Users of Computer Applications to Learning Conference (Naucal).** Contact: Dr. John Mandelare, Naucal registration chairman, Clackamas Intermediate Education District, Marion Hall, Marylhurst Campus, Marylhurst, Ore. 97036.

Oct. 28-31, Cambridge, Mass. – **International Conference on Computer Music.** Contact: Prof. Barry Vercoe, Room 26-313, MIT, Cambridge, Mass. 02139.

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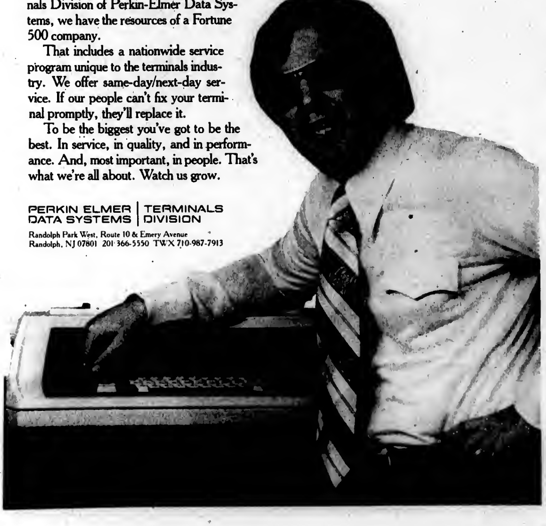

Chess Anyone?

HOUSTON – Entries are now being solicited for the sporting event of the computer world – the Seventh U.S. Computer Chess Championship.

The tournament will be held in conjunction with the Association for Computing Machinery's (ACM) annual conference here Oct. 19-21.

A four-round Swiss-style tournament is planned and the field will be limited to 12 teams. David Levy, International Master from England, will direct.

Application forms are available from Dr. Monroe Newborn, School of Computer Science, McGill University, Montreal, Quebec H3C 3G1, Canada.

NCC '77 Steering Committee Named

DALLAS – Plans for the 1977 National Computer Conference (NCC) to be held here June 13-16 moved one step ahead with the naming of steering committee members.

Conference chairwoman Dr. Portia Isaacson, assistant professor of mathematical sciences at the University of Texas at Dallas, and Dr. Robert R. Korfhage, professor of computer science at Southern Methodist University, have chosen a steering committee from those active in the Southwest DP community, primarily Dallas.

Norman P. Teich of Recognition Equipment, Inc., will head committee communications; Jerry Johns, Texas Instruments, Houston, will be responsible for exhibits; Edward V. Resta of E-Systems in Dallas will handle fiscal arrangements; and Dr. Alex A.J. Hoffman of Texas Christian University in Fort Worth will head local promotion.

Russell Brown of Moore Paper Co., Houston, will head NCC committee liaison while Robert L. Wade of Continental Trailways in Dallas will handle operations.

Harold A. Mauch, Percom Data Company of Garland, has been assigned to personal computing. Dr. Ronnie G. Ward, University of Texas at Arlington, will head professional seminars and Gabrielle Wiorkowski of Richardson will handle publications.

Wayne Churchman, Hewlett-Packard, Richardson, will be responsible for registration and Dr. Dennis J. Frailey of Southern Methodist University, Dallas, will be responsible for society liaison. Dr. C.E. Rodriguez of East Texas State University in Commerce will look after special activities.

Dr. Carl Hammer of Univac in Washington, D.C., will act as committee advisor.

Under Korfhage's direction, the conference program has been divided into four major areas: the technology of computing, management and computing, uses of computing and the individual and computing.

As a special highlight, the conference will also include a program dealing with personal computing along with a national programming contest open to all attendees.

About 250 exhibits are expected to be displayed in more than 1,000 booths, according to the American Federation of Information Processing Societies, Inc. (Afips), the NCC sponsor.

Additional information on the 1977 NCC is available from Afips at 210 Summit Ave., Montvale, N.J. 07645.

Societies/ User Groups

DP Art Exhibit Set For ACM Conference Next Month in Texas

HOUSTON – A "Computer Arts" exhibit will be held here during the Association for Computing Machinery's (ACM) 1976 national conference Oct. 20-22.

The conference committee is planning to have several display areas and is hoping to provide some terminals which will allow spectators to generate their own computer art.

Participation in the exhibit is welcome, the ACM said. Further information is available from Eileen Head, Lockheed Electronics, Inc., 16811 El Camino Real, C-42, Houston, Texas 77058.

IEEE Catalog Available

LONG BEACH, Calif. – The 1976 edition of the IEEE Computer Society *Publication Catalog* is now available.

The catalog includes information on the society's Standing Subscription Plan, which allows subscribers to receive preordered publications at more than a 10% savings, as well as listings from conference, workshop and symposium publications.

Catalogs are available free of charge from the Computer Society Publications Office, Suite 301, 5855 Naples Plaza, Long Beach, Calif. 90803.

ACM Has Proceedings On Meeting for Deaf

NEW YORK – Proceedings of the 1975 Association for Computing Machinery (ACM) Conference on Computing Careers for Deaf People have been published.

The conference, sponsored by the ACM Special Interest Group on Computers and the Physically Handicapped (Sigcaph), was held in April 1975.

The conference featured 30 presentations covering such topics as educational opportunities, special training programs, placement problems and solutions, federal legislation, on-the-job problems and solutions and success factors.

The proceedings contain 125 pages and cost $6.75 for ACM members and $9 for nonmembers from the ACM Order Department, P.O. Box 12105, Church St. Station, New York, N.Y. 10249.

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WANG

'Arcane Nonsense' Seen Just One Use of Personal DP

By Toni Wiseman
Of the CW Staff

LOS ANGELES – Personal computing systems are generally being used to do what computers have always done: automate functions and calculations and handle information storage and retrieval.

The "ideal" personal computing system in 1976-77 could, however, be used for very personal applications including games, personal business processing, hobbies and "arcane nonsense," according to Carl T. Helmers Jr., an editor at Byte Publications, Inc.

This ideal computer would be "a composite of currently existing and proven hardware and software together with newly marketed components" such as the 16K dynamic memories, he told a session at the recent Western Electronic Show and Convention.

Not for 'Purist'

Helmers cautioned that his ideal computer is not for the "purist" or the professional engineer. Rather, it is geared for the computing equivalent of the person who purchases an automobile for transportation and pleasure.

The computing power of the system would be supplied by a contemporary high-performance, general-purpose microprocessor, one with a general-purpose instruction set comparable to a traditional minicomputer, he said.

It would also include ample programmable memory since "applications programming is by nature transient in a general-purpose computer system," he said.

Helmers recommended 8K bytes with the 4K dynamic chips and, when the 16K dynamic chips are available, a standard minimum of 16K bytes with upward growth built in using unpopulated socket positions.

Helmers envisions a video generator sharing timing chains with the processor clock, preferably with 64 char./line with upper- and lower-case Ascii graphics and possibly including limited user-controlled graphics capabilities.

A text data entry keyboard must be integrated into the personal computer, he said, since the computer is otherwise confined to fairly cumbersome interactive sequences.

Audio Provision

At least two channels of data generation and decoding intended for use with audio media should be part of the ideal system, he suggested. "Perhaps 2K to 4K bytes of system software in [read-only memory] is part of the design of the personal computer product," he said.

"There are no toggle switches and banks of LED indicators in a properly designed consumer computer product, since the bootstrap and system service functions are done through the keyboard and display using this software.

"The minimum software should include drivers from the audio tape systems, memory editing and debugging routines for low-level programming enthusiasts, a good text editor oriented to the serial media used for mass storage, I/O routines and service routines with hooks available to high-level language routines as well as applications software," he stated.

No Reason to Sneer

Many people sneer at games and fun implemented with computers and Helmers agreed the $2,000 figure spent on a machine which would perform only games might be an excessive item in the typical family budget.

He argued, however, that there is a real question of whether a game of "Star Trek" is a training ground for military tactics and limited resources problems or just a diversion for an evening's fun, and whether the game of Hammurabi is a sophisticated form of entertainment or a tool for teaching the art of decision making.

The overlap between the use of the personal computer for fun and its use as an educational tool is most pronounced in the simulation games areas, he said. But the educational uses are by no means confined to such simulations.

Rote drill materials are a good example of the educational applications optimally suited to personal computers, he noted.

'Little Black Book'

Helmers suggested the use of the personal computer for "personal business processing" such as aiding in filling out federal income tax forms.

It could also be used to keep track of dates and calendar commitments, to record kitchen recipes or to work as a "little black book" of names, addresses and phone numbers.

Finally, in the realm of "arcane nonsense," a user could tackle something in the area of the science fiction tale theme of "The 900 Billion Names of God."

'Garbage' Calculations

"Just as computers can be used to automate real world 'serious' games and fun, they can be used to automate 'garbage in/garbage out' calculations of a superstitious and mystical nature, thereby lending a false aura of veracity to the result," he stated.

"The opportunities for such applications multiply by orders of magnitude with the lowering of costs for this technology."

Computers have, for example, been used to calculate biorhythms, cast horoscopes and tell fortunes, he noted.

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Editorial

Fact or Fiction?

The AT&T-fostered Consumer Communications Reform Act of 1976 starts down what may become a long legislative road this week when hearings on the bill are held by the House Subcommittee on Communications.

Somewhere during the rhetoric that is bound to flow from both sides, it is to be hoped the subcommittee carefully looks at the impact competition has had on telecommunications.

There is no doubt at all users have a wider range of equipment and service choices because of the competitive pressure exerted by independent companies on the Bell System and its allies.

One significant segment of this equipment pressure has occurred in the data communications sector. Two articles in *Computerworld* [CW, Sept. 20, 27] have sketched the significant contributions made by non-Bell suppliers for users of this equipment. There are other areas, such as PBXs, where a similar story has unfolded.

On the other end, there has been virtually no evidence presented to support the often wild claims of Ma Bell and her friends that gloom and doom will result from this "terrible FCC-fostered" competition.

In one of the latest not-so-thinly-veiled threats, a telephone industry executive has warned phone rate increases resulting from competition could make the oil and gasoline price increases of the past few years seem like a drop in the bucket.

These kinds of scare tactics have been tried before, especially by the energy utilities to justify exhorbitant increases.

And while the telephone companies have been wailing about the evils of competition, the Bell System became the first U.S. firm to earn $1 billion in a quarter. All this as the Data Transmission Co. (Datran) was living through its final days of providing a digital service alternative to users. These don't seem to be clear and present signals that Bell has done much suffering at the hands of its wicked competitors.

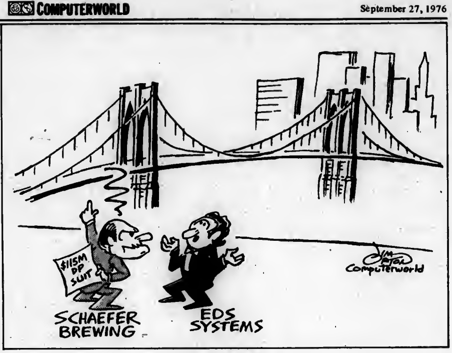
The telephone industry should be given every opportunity to document its case for the Reform Act before Congress. But the legislators must insist that both sides produce conclusive evidence to support their positions.

If the phone companies are not able to document the dire consequences on which the framework of the proposed legislation is based, the entire concept of this bill should be thrown out once and for all.

Bell has been waging this battle unsuccessfully in any and all available forums for several years without success. This last-ditch effort has now reached the halls of Congress with support from many members for an open discussion of the issues.

If the legislators sincerely want to evaluate this legislation, which attempts to wipe out an inspiring industry, they should not be afraid to step forward and oppose the bill.

The telephone industry has cried wolf for long enough. This week begins its last chance to unequivocally prove its point — or forever hold its peace.



'Sorry, No Refunds . . .'

Letters to the Editor

Slick, White-Collar Ripoff Demonstrates Lax Data Security

The escapades of six alleged peddlers of good credit ratings [CW, Sept. 13] once again reminded everyone, both computer professional and layman alike, how woefully lax are the security arrangements protecting highly sensitive data in many large data banks.

In this slick, white-collar ripoff, individuals with poor credit histories are alleged to have paid fees ranging from $300 to $1,500 to have their credit reports altered to reflect excellent credit track records.

Not only did this purported scheme last almost a year, from August 1974 to the end of March 1975; but it also only required the willing cooperation of a sole female clerical employee of the credit bureau.

For these alleged shenanigans to have lasted so long and to have been so easy to perpetrate is downright appalling, especially when you consider that the victimized credit bureau maintains files on about 50 million Americans.

Since so many individuals are exposed to so much potential harm, stricter regulations should exist to demand better safeguards for the private data files of millions of unwilling and/or unsuspecting Americans.

Thomas Wong

New York, N.Y.

Pessimism Not Shared

I agree with the importance of retaining a suitable environment for the smaller entrepreneurs, but I don't share *Computerworld's* pessimism about our shrinking numbers as stated in the editorial of Sept. 13.

Cheaper computers are bringing about a quiet second revolution in DP and opening up a ripe field for competent software professionals. With computers sold off-the-shelf in many cities, it is hard to imagine any area in our life where personal computing will not have reached by 1980.

Small- to medium-size businesses can now afford their own in-house systems and, as far as present users are concerned, it's about time they woke up to the fact decentralization and on-line systems using minicomputers are the key to effective DP.

As with many other problems, better education would cure a variety of ills and this is where IBM's competitors should spend a few of their advertising dollars.

Andrew W. Beretvas
General Manager

Minicomputer Technology
Berkeley, Calif.

No Such Language

It appears that Miles Benson [CW, Aug. 23], Jonathan Sachs [Sept. 6] and Michael D. Shapiro [Sept. 13] are utterly confused. As far as I know, there is no programming language named Snobol 68.

There is, however, a language called Algol 68 and Benson's original remarks sound very much like the comments made in some circles about Algol 68 (which was indeed implemented in England, at the Royal Radar Establishment in Malvern).

The categorical remark by Sachs that "someone with a vested interest smothered [Snobol 68] under a dollar-scented blanket" is probably pure guesswork.

Though I'm far from being a Snobol 4 expert, I think Shapiro's defense of Snobol 4 made a lot of sense. The only problem is that he was defending the wrong language.

Francis Pardo

New York, N.Y.

Data Past

Five Years Ago
Sept. 29, 1971

NEW YORK — After more than 15 years in the business, RCA dropped its general-purpose computer line with an announcement from Robert W. Sarnoff, RCA chairman and chief executive officer. RCA dropped out of the business, Sarnoff said, because studies indicated it would have to invest an additional $500 million in the Computer Services Division between 1971 and 1976 to make it a viable operation.

Eight Years Ago
Sept. 25, 1968

WASHINGTON, D.C. — The Federal Communications Commission reaffirmed a previous ruling making the tariff on foreign devices attached to the telephone network unlawful. AT&T formally filed a new tariff which was to take effect Nov. 1 and provided for the attachment of customer-owned terminal devices through a $2/mo telephone company protective device, but which still restricted the general interconnection of customer-provided communication systems with the telephone network.

– – –

MAYNARD, Mass. — Digital Equipment Corp. introduced a time-sharing system called the Time Share-8 based on its PDP-8/I CPU and designed to allow a user to call up a CPU from a teletypewriter terminal for backup when necessary. DEC estimated it could provide multilingual services with the system for educational and industrial applications at between $2 to $3 per terminal hour.

The German Dilemma

This is the last of a series of columns on Europe-at-the-computer-crossroads. I could go on with Italy, Holland and all the way to Yugoslavia; computers are vital everywhere, and every country wants to make some sort of entry. In some nations the urge is as primitive as the one which in Africa leads to Zambia Airways; in others, there is justified pride in early and original contributions – Denmark is a case in point. And of course, as data processing and computing and data communications edge up toward two or three percent of national expenditures, questions of trade balance begin to be important.

Germany – and of course I mean only West Germany; the Communist adventures could be on another planet, as far as CW readers are concerned – has a fascinating and complex pattern. Like England, and unlike France, there was pioneering invention; Konrad Zuse, along with Bell Labs and IBM men, conceived and built relay calculators forty years ago. Unlike either country, but like Japan, Germany built from an erased economy, with new facilities and a dedicated work force. And like America, there was in Germany a tradition of applied science and advanced technology, in separate institutes as well as in the universities. They did not, and do not easily even today, permit easy migration between the institutes, technical colleges ("high schools") and universities, and industry. That has worked to their disadvantage, and a glance at smaller countries like Austria, where brilliant computer people had to wear several hats of necessity – had to be teachers and researchers and entrepreneurs all at once – shows that intermingling pays.

But Germany is large. German traditions, although not terribly old, are rigid. Young people, as in Britain, find themselves assigned to educational tracks – three, in Germany – quite early on, and cannot easily trade up. The eclectic nature of early computer application made imaginative adventures possible on the user side; a young mathematical physicist named Wenke did great things for BASF, until they discovered he had a wrong degree (that is, not a doctorate in chemistry or chemical engineering). Punched card people at mail order houses and department stores beat out their American and Japanese counterparts at order entry and inventory control, until our B-school kind of highbrowism slowed them down.

But on the hardware side, tradition prevailed. Zuse's company, which could have been another DEC, was brushed aside. Attention went instead to the industrial giants: to Standard-Electrik-Lorenz, to AEG and Telefunken and finally to Siemens. SEL bid for the Air France reservation system, and botched it. AEG played footsie with our GE – two babes lost in the IBM woods. Telefunken tried to build big scientific machines, with encouragement from the appropriate ministry, which promised the product to the universities and *forschungsgesellschaft*, and got all tangled up. I remember looking at one of their developmental tape drives at Lake Constanz in 1962; great, if you wanted to employ watchmakers. At CDC, Tom Kamp was selling direct drive; simple, sturdy and fairly cheap.

And Siemens? Well, they had an advantage over the others: a vigorous young executive who understood the business. Heinz Gumin, his name was, and he came to the Eastern Joint in 1958 and told us about plans for the 2000 series. The RCA license must have been under negotiation too, but of course we didn't know that.

And now I come to the German problem. Unlike the French and the English, and some years before the Japanese, they decided to go the Big Company route. Perhaps it was a function of the time; in the United States, RCA and GE were the newsworthy entrants. In the next decade, it would have been DEC; in the Seventies, the LSI houses; the German course was set in the mid-Fifties.

To sell against the Gray Giant, even close to home, requires vast gobs of capital. Siemens has put in perhaps $900 million, of which about $200 million came directly or indirectly from the government. Of course they have created a valuable asset base: patents, lab and factory installations, machines on lease and rental. But there looks to be no end in sight. How long will the directors of a diversified company keep on pouring money into the computer shop, when they get far greater returns from other products?

Europe indeed has its dilemmas!

Herb Grosch

Overbooking Victimization Ignored But Measurable

The Taylor Report
By
Alan Taylor, CDP

The article "Airline Overbooking Exemplifies Classic DP Problem" [CW, Sept. 20] was written prior to rejection of the idea proposed by Delta Air Lines and other airlines that the public should be informed about overbooking through insertion of a notice in the tariffs. It was also written before the appropriate authority suggested what publicity it would approve.

Presently, the Civil Aeronautics Board (CAB) maintains passengers should be directly informed of the deliberate overbooking of confirmed seats by means of large notices. Regardless if this is actually done, the possibility of such action does have some obvious effect on the current use of computer-optimized systems – and some unobvious ones also.

The person denied boarding will now know the reason for this action was not some computer error, as used to be the standard cover-up, but instead a clear-eyed, deliberate policy by the airlines to follow computer suggestions.

This will probably cause the victimized passengers to be more insistent about being appropriately compensated and less inclined to settle for some off-handed application of the current CAB rules. Some may even be prepared to take matters to the Supreme Court, as Nader did with Allegheny Airlines.

With this possibility a real one, no solution that preserves overbooking as a policy can be regarded as stable, even though it may be implemented by every airline and approved by the CAB.

Potential Victims

The potential victims – every single passenger – will evaluate their own position with the same lack of moral scruples as evidenced in the airlines and many may start or continue to book defensively. This can be quite effective, and has provoked numerous counterefforts by the airline computers which must be costing a pretty penny.

There doesn't seem to be any way to defeat this quite natural attitude. (See box). Overbooking is causing no-shows, which launches another attack on the basis of the computer simulations and the justifications urged.

The basis of the airlines' argument is that in view of the claimed 10% to 15% of travellers who alter their travel plans without informing the carrier, overbooking must be practiced to minimize airfares. No-shows are the cause and overbooking is the effect. It seems logical, but not when defensive booking is being practiced by the passenger.

Because the airlines refuse to provide anyone with a genuinely confirmed reservation, passenger defensive booking results in multiple bookings. The first available seat is used and the others become no-shows. Here the overbooking is the cause and the no-shows are the effect.

This means the apparent no-show figure is made up of some real no-shows and some secondary ones caused by the airlines solution. The numbers of each are not known, but it can be confidently predicted that the rate of increase of secondary no-shows is currently increasing much faster than genuine no-shows. So, now the problem is snowballing.

Victimization Measurement

So much for the current situation from the system viewpoint. These parts are obvious. What is not so obvious is that the power to change the system from outside is based on characteristics not currently noticed in the computer simulation. The points that measure the amount of individual victimization are simply not available, yet the possibilities can be measured.

Clues as to what the measurement is are shown in the Nader case. Here the measurement involved:

- The lack of notice to Nader.
- The number of people waiting for Nader.
- ; The difficulty or impossibility of rescheduling.
- The unavailability of alternative routes.

The first and last are known or capable of being known by the airlines. The second and third, however, are not and they will effect the measurement of victimization by computer optimization very considerably.

Provision must be made for these by providing genuine reservation systems to at least some seats. Total overbooking systems are almost certainly doomed, and will soon follow the unpublicized-overbooking era that has now ended.

The measurement of knowable victimization levels will have to be introduced into the continuing partial-overbooking systems. More aggressive methods will also be needed to reduce the number of overbooking victims. This practice has not been directly addressed by the airlines in their publicity campaigns. Yet here is one of the major areas where computer simulation can – and should – help.

The possibility of such aggressive operations will be discussed in the next column. I welcome any ideas you have as to how computer use can minimize refused seats. Till then, remember what is happening here is not a unique scenario, but is the anticipatable life cycle of many computer simulations and optimizations. So, if you are involved in planning or evaluating any such applications, review the situation with these factors in mind.

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How to Get a Safe Seat

Under current systems there are at least two methods of defensive booking which will provide genuinely confirmed seats. Method A provides confirmed passage by an outside time limit and is usable if the traveler has time to squander at the airport. If he doesn't, Method B can be used.

Method A. Two-Flight Booking

The traveler books on an available, earlier flight as well as on the flight that will get him where he wants just in time. He leaves enough time between the flights to compensate for having to go from one gate to another plus about 45 minutes. This way he is one of the first to board (having taken his seating position carefully) and can guarantee the second seat if he is bumped off the first.

Cost: Passenger time and one no-show per use.

Method B: Neutralization Bookings

Where the traveler cannot afford the time required by Method A or where the system simply doesn't have later flights, he can change the pseudo-confirmed seats issued by the airlines to genuinely confirmed seats (for himself and others on the flight) by reserving sufficient seats that will use up the overbookings.

Cost: Many no-shows per use.

Letters to the Editor

How Many Will Write To Defend a Pet Language?

I wonder how many Michael Shapiros [CW, Sept. 13] will write to *Computerworld* in defense of their pet language, assuming it was the one maligned in my "Snobol 68" article [CW, Aug. 23].

I'm sorry, Michael Shapiro and all you others; the article should have said Snobol 68 was a pseudonym, uncleverly disguising the real name of the language (which was not Snobol 14, Michael).

Guess again, anyone?

Miles Benson

Seattle, Wash.

Important Role Overlooked

I think the article "Responsibility of DPers Cited in Keeping U.S. Cities Alive" [CW, Sept. 6] reported some unbalanced statements. I agree DP persons responsible for government information systems have a definite role in keeping these systems effective and reliable, but Sugarman seems to overlook the equally important role of government leaders and executives.

Most conscientious DP personnel know the frustrations of trying to develop information systems for executives who are unable or unwilling to aggressively direct the development of these systems. These people only get involved after the systems are developed, and then they expect it to deliver all the information they want.

Government leaders and executives must eventually understand that the key to good information systems development is a complete, systematic definition of the requirements of such a system with full participation and direction by these leaders. Making DP personnel the scapegoats for every system inadequacy is no way to improve these systems.

Government leaders and managers must share equally if there is any blame to be assigned. They must share in real participation in the development of these systems.

John R. Murphy
Director
Division of Management
Services and Systems
Human Resources Administration
City of New York
New York, N.Y.

Shortcomings Exemplified

As a long-time student of psychology and data processing, as well as a resident of Atlanta, I read with some interest the article, "Psychological Reasons Hindering EFT Acceptance" [CW, Sept. 13]. Leonard L. Berry's comments are a prime example of the serious shortcomings of universities and professors – a lack of experience in the real world.

I see automatic teller machines (ATMs) everywhere I go in Atlanta and the Southeast and I find them convenient and easy to use. My bank, Trust Company of Georgia, has 15 or 20 ATMs installed and the proximity of an ATM to my home was a primary reason for selecting my bank.

While not specifically electronic funds transfer (EFT), a consortium of banks in Atlanta has initiated an on-line check approval system using plastic, magnetically-encoded cards.

While there may be few ATM operations that have broken even, the First National Bank of Atlanta has one of the most successful ATM programs in the U.S.

If the EFT industry is not rushing toward overextending its capabilities, then more power to it.

Stephen Crane

Atlanta, Ga.

In Praise Of Pride

I wonder at the fact that in publishing my letter to the editor [CW, Aug. 30] you have deleted the initials CDP from my signature. I have a great deal of pride in being a Certified Data Processor, and as a member of the board of directors of the Institute for Certification of Computer Professionals, I am particularly saddened at *Computerworld's* insensitivity to a growing feeling of professionalism in DP.

Perhaps my monumental ego is trapping me into making a mountain of a molehill, but damnation! Pride in one's work is at the core of my original letter.

The day I can't take pride in what I do, I'll shine shoes for a living.

James M. Brown

Chicago, Ill.

System Must Deter Misuse

The discussions of computer theft by phone in *Computerworld* emphasize once again the ease of employing the telephone for misdeeds.

The Massachusetts problem of determining whether a wager placed by telephone is legal (intrastate) or illegal (interstate), the problem of the widow receiving a crank midnight call, the use of phones by terrorists to extort their demands from the public and computer theft by phone all have one item in common: the anonymous nature of the active party (the caller) and the unanonymous nature of the passive party (the party telephoned).

The logic of a system which allows the active party, who is invading the privacy of others, to remain anonymous is highly questionable.

It would appear that a simple way of eliminating much misuse of the phone system would be to require the phone companies to utilize the circuitry which transmits the telephone number of the calling phone to the phone company's billing system to simultaneously transmit this number (all 10 digits) to the phone called.

An option should be offered to the public which would employ a 10-digit numeric display similar to those of today's inexpensive pocket calculators and would display the telephone number of the calling phone.

Such a simple device could greatly reduce harassment by phone and would reduce one of the current major advantages of the electron thief – his anonymity.

John F. Cain

Bridgeport, Conn.

Easier Maintenance Sought

Regarding the letter from Anita Benson [CW, Aug. 16] on creative programming, we have recently adopted structured programming. Our objective is to stop developing creative programs that are extremely difficult to maintain.

I do not believe structured programming and creativity have to be mutually exclusive. There is still a great deal of room (and need) for creativity in the design of systems, programs and in programming techniques. However, the purpose has to be to satisfy the user and this requires programs completed on schedule, error free and easily modified.

Data processing has progressed to the point where acceptable performance requires more than simply getting a program to run.

Mike Murnane
Systems Manager
Management Information Systems
Shaklee Corp.
Emeryville, Calif.

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Three Areas of Danger

Software Tools Being Used for Wrong Reasons: Mack

By Don Leavitt
Of the CW Staff

LONDON – "We software people have dragged the hardware engineers down to our level," Edwin S. Mack charged in keynoting the recent European Computing Congress (Eurocomp) here and commenting on the questionable uses of the tools developed in computer performance evaluation (CPE) and software projects.

The classic engineer has the skills needed to provide an objective analytical view of a problem under study and to add some value to whatever he does, the director of product development at International Computers Ltd. (ICL) said.

By contrsst, the project manager in a data center has – or should have – a far more pragmatic view, he added.

The pragmatist would see the use of a computer in most instances adds nothing of value to the work being done; rather, the computer's primary reason for being is to cut the overhesd required to handle a job that must be done, regardless of the means, he explained.

The technicians who are now sometimes called software engineers have provided some tools useful in cutting back on the overhead needed to produce and maintain "useful" softwsre programs. Beyond that, the CPE professionals hsve added a range of tools intended to help the manager make the dsta center actually work more efficiently, he said.

But the managers themselves seem to have a variety of reasons for using the tools, and there are various pitfalls lying in the path of those who use them unwisely, Mack warned.

CW At Eurocomp

Some use the tools to avoid trouble. They realize it is hard to mansge a project if its design is poor, for example, or if the hardware system is the wrong size for the workload, he went on.

Others use the tools to minimize the resources needed to get a job done. This might have a pay-off in staff productivity on the one hand, or longer life for a hardware system on the other, the ICL official noted.

Still other users see the tools as aids to implementation, he said, adding this seems to be psrticularly true in the area of acceptance testing.

Almost as an aside, he commented on the view still held by some that programming is an srt form: "Personally, I've long held to the motto 'Never let the best get in the way of the good.' Recently a colleague carried that pragmatic approach one step further: 'Never let the good get in the way of the acceptable.' "

There are other reasons people use the software engineering and CPE tools, he said, but they aren't good reasons. These reasons include "just plain curiosity," an attempt to win an argument or a try at using the tools which are apparently the "in thing."

An experimental approach or the use of the tools to provide "busy work" for a staff that has little development work may be either good or bad reasons for using the tools; Mack left that choice to the 300 delegates who heard his talk.

In any case, he warned, "after much study, it now appears there are three areas of danger in the use of these tools – before, during and after implementation of a new system."

As a project is taking shape, the jargon and the definition of terms – often meaning different things to different people – is the first pitfall, according to Mack. He mentioned, as an example, how a friend had reported to him that "our commitment was 12, but we're going to be able to do eight."

Thinking about some bugs the team had

(Continued on Page 24)

'Fuzzy' Kiviats Proposed for Management

By a CW Staff Writer

LONDON – The idea behind "conventional" Kiviat graphs is to provide nontechnical management with a picture of how well their computer systems are performing, but the pictures produced really are not comprehensible to the intended users, according to a Mitre Corp. analyst.

Speaking at the recent European Computing Congress (Eurocomp) meeting here, Jim Elliott said the clssic Kiviat graph is at once too specific and too imprecise to be acceptable.

The only picture management can really appreciate is that produced on a "fuzzy" Kiviat graph, Elliott said.

The original Kiviat graphs, he explained, are circle charts with an undefined but even number of spokes radiating from the center. The spokes are used to plot the ratings of "good" and "bad" individual performance indicators.

The problem with that is two-edged, Elliott continued. There is no sgreement on what indicators are "good" or "bad" or which should be used, nor any agreement on the meaning of the various patterns produced by this unstabilized vehicle.

In place of the "stars," "sails," "keels" and other general shapes some have identified in connection with Kiviat graphs, Elliott proposed a presentation scheme combining parts of the Kiviat approach, parts of the "fuzzy set" theory of mathematics and parts of a general system theory embodied in a diagramming scheme called the Resource Planning and Management System (RPMS).

Elliott's fuzzy Kiviat graphs retain the basic circular form of the original graphs, but the scaling of RPMS elements that make up the patterns produced is three-part (good, fuzzy and bad) rather than a continuous spectrum; individual elements are not plotted at all.

Working with the principles of interval

(Continued on Page 24)

Graph's Originator Reacts

LONDON – A mixture of emotions could be sensed in the voice of Phil Kiviat when he told a European Computing Congress (Eurocomp) technical session his reaction to the "fuzzy" Kiviat graphs suggested by Jim Elliott of Mitre Corp. (see accompanying story).

The technical director of the U.S. Federal Computer Performance Evaluation and Simulation Center said he had come up with the original idea for the charts that now bear his name, but really all he did, he said, was adapt the chart used by doctors to visually illustrate a patient's life signs to represent the life signs of a DP system.

He saw the DP-oriented version as easier for managers to grasp than the pageful of numbers most monitoring or job-accounting systems generate.

Kiviat was particularly concerned about Elliott's attacks on the so-called requirements of conventional Kiviat graphs. Admitting he had visualized the use of radii as plot points for performance indicators, he said he had not set up the rule that there hsd to be an even number of axes.

Although he generally agrees with the idea of the even number of indicatora and with the corollsry that they should be alternstely "good" and "bad" indicators, Kiviat said it was others who had imposed those prerequisites.

As long as a consistent set of indicators is used and each is in the same position around the circle from graph to graph, a manager can see if and how performance has changed from one plot period to the next, Kiviat explained.

The bssic shspe, rather than any "figure of merit" that might be derived from it, would "tell" the manager if there was a slew in an undesirable direction or a recovery from a previous problem, he added.

Conference to Compare 24 General-Purpose DBMS

LOS ANGELES – Twenty-four general-purpose data base management systems (DBMS) will be compared at a four-day conference at the Ambassador Hotel here Oct. 19-22 sponsored by the Extension Division of the University of California at Los Angeles (UCLA).

Designed for prospective DBMS users, the conference will feature presentations by representatives of the firms thst developed each system.

In addition to providing prospective users with insight into the general areas of the software and services industry, the conference will also feature comparative evsluations through "hands-on" testing of sample data bases accessible to terminals, according to a UCLA spokesman.

Conference events will run from 9 a.m. to 7 p.m. daily. To allow for the differing requirements of those participsting, the conference will include parallel sessions on minicomputer-oriented systems and midl/large systems, he sdded.

Firms that will be represented include Burroughs Corp.; Cincom; Computer Corp. of America; Control Data Corp.; DBMS, Inc.; Data General; Digitsl Equipment Corp.; ELS Computer Engineering; Forth/Cybek; General Electric; Honeywell Information Systems; Hewlett-Packard; IBM; Infodata; Informatics, Inc.; Mathematica, Inc.; Meade Technology Corp.; MRI Systems Corp.; Microdata Corp.; National CSS; Softwsre AG; TRW, Inc; Univac; and the University of Windsor.

Cost of the conference is $325/person. Additional details are available from the Msnagement, Labor and Business Department, UCLA Extension, P.O. Box 24902, Los Angeles, Calif. 90024.

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'The Librarian' Now Available For IBM 360/370 VS Users

PRINCETON, N.J. – Applied Data Research, Inc. (ADR) has introduced a version of The Librarian, its source program management system, for IBM 360/370 users running under VS.

The Librarian/VS contains all the features and facilities of The Librarian, and the two systems are currently identical from a functional point of view, an ADR spokesman noted.

Additional Features

Additional features of the VS version include reduction of loading frequency because of a residency feature and a corresponding reduction in the amount of I/O to the load libraries, ADR said.

The Librarian/VS uses up to 20% less CPU time than the standard Librarian; the total number of I/O operations can be up to 35% less; all out-paging is eliminated; and in-paging is reduced, ADR claimed,

The program is fully reentrant, the spokesman added.

Restructured Version

The VS version has also been restructured to minimize the size of its working set; to achieve minimum amounts of paging, the logic and data areas most heavily used in close proximity, the company said.

The system is constructed to operate in the Pageable Link Pack area of any VS operating system.

One Copy Per Site

All users of The Librarian/VS at an installation share the same copy, which is loaded only once at IPL time, the company said.

The permanent license for the VS1 and VS2 versions of the system is $5,800; the DOS/VS license costs $4,900 from ADR at Rt. 206 Center, Princeton, N.J. 08540.

Correction

Hewlett-Packard Co.'s HP 2641A CRT terminal, introduced with the APL 3000 standard language package for the company's HP 3000 Series II CPU [CW, Sept. 20], costs $4,100 with 4K bytes of memory and $5,700. with memory and tape cartridge transports.

'QLP 1100' Gets Report Writer

BLUE BELL, Pa. – Univac has extended its Query Language Processor (QLP 1100) to broaden the application range of this interactive interface to DMS-1100 data bases.

The Level 2 release provides a set of report-writing facilities in addition to the Level 1 retrieval capabilities.

The report writer enables end users to specify the appropriate format for "practically all types of data base reporting requirements," a spokesman noted. Presentation groups can be associated with detail groupings, control headings and footings, page headings and footings, report heads and footings and a message page, he added.

Information can be retrieved from the DMS-1100 data base with the report writer by item name even when the inquirer is unaware of data base storage structures or access methods employed in the schema, Univac said.

While items referenced can reside within different types of records within the data base, those records may be logically related in the schema, according to the spokesman.

QLP 1100 Release 2, available now, is free to users of the 1100 series operating systems software. Univac is at P.O. Box 500, Blue Bell, Pa. 19422.

'Fuzzy' Kiviat Graphs Suggested for Non-DPers

(Continued from Page 23)

mathematics, Elliott said he determines maximum and minimum values for each element, averages them and plots the averages in circular form around the center point.

The resulting pattern has varying diameters, depending on the "goodness" of the system, and varying center "holes," depending on the "badness" found.

General Conclusions

In general, the greater the outside diameter, the better the system being plotted, but a wide hole in the middle indicates some weakness in the system. In any case, Elliott noted, the total area of the circular figure between the maximum and the minimum values is a reasonable figure of merit for the system being plotted.

Since these patterns are always built up from the same parts of the RPMS that describe a system, he said, they can justifiably be used to compare the performance of two or more systems when each is proposed as the solution for the same problem.

Or the fuzzy Kiviat graph might be used to show how the performance of a single system has changed over time, he added.

If his basis is valid, Elliott concluded, the newest variant of the Kiviat graph overcomes the weaknesses of the original. It offers a simple pattern that managers can understand and feel comfortable with, it avoids arguments – usually among technicians – as to whether a specific performance measurement is "good" or "bad" and it provides the basis for comparative single figures of merit.

Software Tools Used Unwisely

(Continued from Page 23)

been trying to resolve, Mack wasn't pleased by this report or by the smile on his colleague's face until he realized his friend was talking about how the team had cut four seconds off the response time to a typical transaction – and not about bugs at all.

Even the right tools can get in the way during the design phase of a project, he pointed out. "There is no substitute for thinking," he noted. And, of course, use of the wrong tool could be disastrous, he added.

During implementation, a user can sometimes fall into the trap of depending too much on the computer to "miraculously" resolve or at least identify all his problems. Or he will leave debugging code in a program after it's all "clean" – and then wonder why it runs longer than it should or takes more memory, Mack said.

After implementation, measurement results are still susceptible to misinterpretation, so users aren't immune to pitfalls even at this stage of a project, he warned.

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Sectioning Base Array Voids Fortran Size Problems

By Bruce Weinstein
Special to Computerworld

The storage control features built into PL/1 are not present in standard Fortran. In almost all cases, it is impossible to write non-restrictive code that requires minimum storage without some kind of an array overlay procedure which allows reuse of storage areas not needed for the duration of program execution.

Concepts and Techniques

We have developed techniques which overcome these shortcomings and which may be implemented on existing Fortran programs to gain flexibility.

The rigidity of common Fortran coding is illustrated by a common request – to modify an otherwise satisfactory program to enlarge the dimensions of an array buried somewhere inside one of its subroutines.

When the program was designed the question of individual array size probably surfaced and at that time no one thought it could possibly grow beyond its design value.

In fact, the question of array size need never be asked by the designer.

All Fortran programs may be organized so that arrays with varying capacities are grouped as subsections of one large array accessible from the main program. The size of this large array is solely determined by a five line subroutine which may be recompiled at the user's convenience.

The large array and its length are stored in a COMMON area which is included in the main program and the five line SIZE module:

```
 SUBROUTINE SIZE
 COMMON/MEMORY/LENGTH, BLOCK·
(NNNNN)
 LENGTH = NNNNN
 RETURN
 ENO
```

NNNNN is the capacity of the large array in words.

The sizes of the individual arrays (subsections of the large array) are calculated from parameters read in at execution time. These calculations must take into account whether the arrays are to be addressed as half-words, full words or double words in the subroutines called. Thus the large array element which is the first element of each individual array can be calculated.

Since Fortran passes only the address of an array in a subroutine calling sequence, the calling sequence need only contain the array element of the large array where the individual array begins.

The main program needs components to receive the array allocation information, to calculate the pointers to the large array subsections, to determine if there is sufficient space in the large array for the subsections and to direct the flow through the program according to options read in at execution time.

The main program uses NAMELIST input to pass the allocation information:

```
 COMMON/MEMORY/LENGTH, BLOCK(1)
 NAMELIST/OPTION/NA,NB,NC,NO
 CALL SIZE
 REAO (IN,OPTION)
 LB = LA + NA * NB * NC
 LC = LB + INT ((NB+1)/2.)
 LO = LC + 2 * NB * NO
 LMAX = LO + NA - 1
 IF (LMAX.GT.LENGTH) STOP
 CALL SUB1 (BLOCK (LA), BLOCK (LB),
BLOCK (LC), BLOCK (LO), NA,NB)
 LE = LC
 LMAX = LE + 2 * NC - 1
 IF (LMAX.GT.LENGTH) STOP
 CALL SUB2 (BLOCK(LA), BLOCK (LB),
BLOCK (LE), NA, NB)
 STOP
 ENO
```

The array subsections are arranged to reflect how long through the program flow the information contained in the subsection is to be retained. Subsections that contain information no longer needed may have the memory space that they occupy overlayed by subsections (not necessarily of the same size) needed by other subroutines.

Subsections that are never overlayed are equivalent to static storage in PL/I. Overlayed subsections simulate PL/I automatic storage.

One-dimensional arrays contained in the calling sequence need only be declared to have a dimension of one in the called subroutine since the space requirements for the array have been allocated in the main program. Except for the last dimension, multi-dimensional arrays need all dimension information declared either explicitly or implicitly. This is necessary because the subroutine needs to know how to address the subsection allocated to it.

Implicit dimension information can be passed in the subroutine calling sequence as is done in subroutine SUB1 which is called by the main program above:

```
 SUBROUTINE SUB1 (A,B,C,O,NA,NB)
 INTEGER* 2 B
 DOUBLE PRECISION C
 OIMENSION A (NA,NB,1), B ( 1), C (NB, 1),
O (1)
 •
 •
 •
```

Since the arrays are part of the calling sequence, no memory is required for them in the subroutine other than the word required to pass the address of the first element.

Any existing Fortran program can be easily modified to incorporate these techniques by adding the required features: Expand the subroutine calling sequences to include arrays for which variable dimensions are desired, calculate the large array pointers to the individual arrays in the main program and pass these, together with any object-time dimension information, to the subroutines.

Bruce Weinstein is an environmental scientist with the County Sanitation Districts of Los Angeles County, California.

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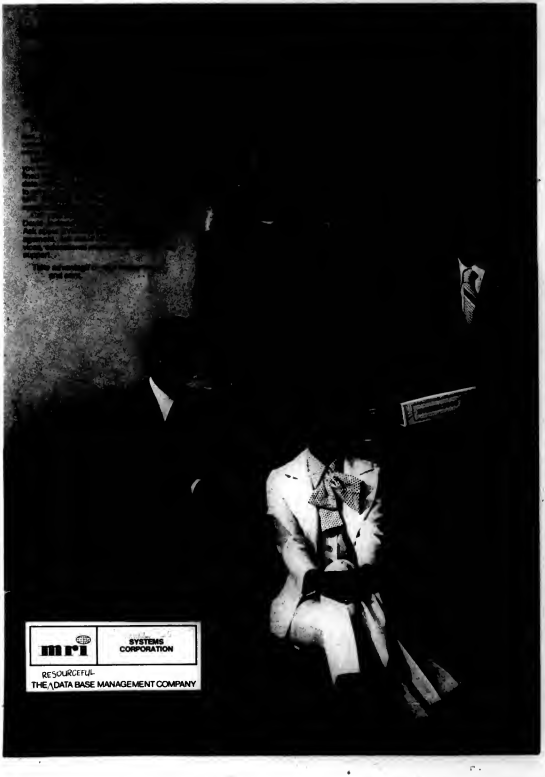

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EEO Commitment Can Erase DP's Anti-Women Bias

By Barbara C. McNurlin
Special to Computerworld

U.S. law says there can be no discrimination in employment based on sex. But companies are finding it unpalatable to comply with this law in more than a token manner.

The result has been a number of massive court-ordered settlements by companies that thought they were complying with the law – settlements of hundreds of thousands to millions of dollars.

The Equal Employment Opportunity Commission (EEOC), which is charged with enforcing compliance with the federal Equal Employment Opportunity (EEO) laws, states that since the passage of these laws in the mid 1960s, *overt* discrimination by individuals against individuals has declined. Today, one person is not so likely to consciously discriminate against another person.

However, *systematic* discrimination is still occurring in employment practices. Systematic discrimination results from the seemingly neutral employment practices that unintentionally perpetuate discrimination.

The identification and elimination of systematic discrimination are the major focus of EEOC's efforts today. To this end, the courts have ruled that it is the consequences of employment practices, not the intent, which determine whether discrimination exists that requires remedial action.

How much sex discrimination exists in DP? There seems to be mixed reports on this. Statistics show few women are in computing management but, at the same time, some women in the field report having felt no discrimination.

DP is not a traditionally female or male profession; it has always been open to men and women. Since entry-level jobs are accessible to women, they do not feel the need to be "noisy" about the need for change.

The Human Connection

In this type of profession, women are more likely to work through the system to break down treatment barriers that inhibit upward movement within the field. Some women, in this situation, may not even be aware of discrimination.

In 1971, T. Levitan reported on the discrepancy between working women's perceptions of sex discrimination and objective discrimination that actually exists. In a national study of 539 working women, she noted, only 7.9% reported having been discriminated against in any way on their job because they were women.

In actuality, Levitan found, there was evidence of discrimination against 95% of these women.

Levitan surmised the reasons for this discrepancy were many. Possibly the women rationalized an unpleasant situation, or maybe they compared themselves to other women rather than to men. Maybe they felt that men *should* receive more occupational rewards, or maybe they recalled only overt discrimination. Whatever the reasons, Levitan concluded objective discrimination was unrelated to perceived discrimination.

Although there appears to be little salary discrimination against women in the computing field, based on the studies we have seen, there *is* systematic discrimination. There are few women in the higher positions in computing, the result of company personnel practices as well as cultural attitudes.

Many authors have commented that changing the laws is not enough to effect equal employment opportunities for women. Other, more intrinsic, changes must occur within the organization structure and with employee attitudes in order for a successful equal employment opportunity program to exist.

These changes must occur on three corporate levels:

- Create a positive corporate environment.
- Resocialize men's attitudes.
- Train women for management.

The single most important ingredient for creating a positive corporate environment is top management's genuine commitment to EEO. Without this, even the most receptive EEO officers and middle managers will have no luck promoting women – and, in addition, will probably get themselves into trouble.

Once the commitment is there, top management must make sure there is continued commitment down the line. This is no easy task because the ranks of middle management is where many subtle discriminatory decisions are made. So management must implement a program to monitor the actual compliance by managers.

To change a person's attitudes directly, it is necessary to get the person to see and understand the basis for these attitudes. This is basically what awareness training for managers is all about – resocializing men's attitudes. Awareness training sensitizes line managers to their traditional attitudes that form subtle barriers to EEO.

This is not to say that only men form these barriers; women managers also have attitudes which prevent them from making objective decisions about women subordinates. But male managers seem to be less aware of these preconceived generalizations than women.

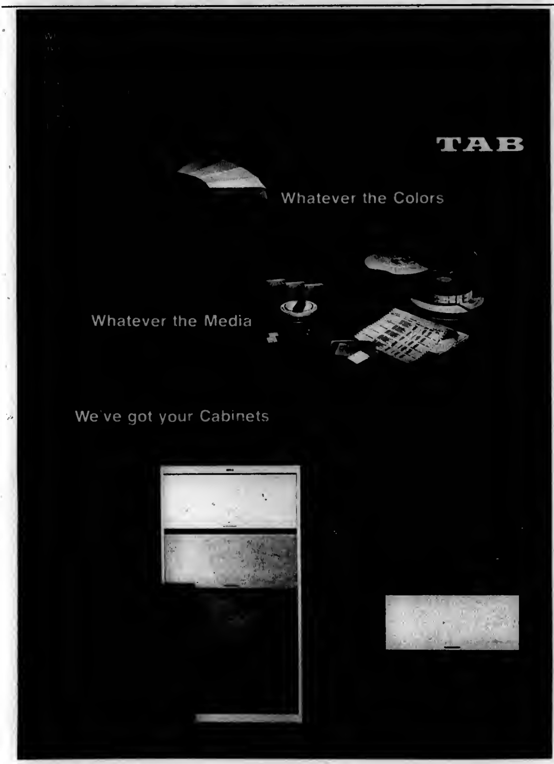
Instituting resocialization programs for middle male managers is an important ingredient for successfully bringing women into management. Further, it is one approach few companies are taking.

In the area of equal employment opportunity, the next 10 to 15 years will be painful because of the social change that must take place. Corporate structural systems and cultural attitudes are the basis for sex discrimination, and these are not easy to change. Management on all levels must take the approach that will be to the company's benefit.

Putting qualified women into management positions is not only an obligation, it is a positive action that will become an asset to any company.

This article is an excerpt taken from the August 1976 issue of the EDP Analyzer, *entitled "Bringing Women into Computing Management," which is available at $6/copy from Canning Publications, Inc., 925 Anza Ave., Vista, Calif. 92083.*

McNurlin is a member of the staff of the EDP Analyzer.



Data Briefs

Kent Switch Unit Features Cable-to-Modem Connection

HOUSTON – Kent Computer Corp.'s KCC-232 Communications Switch Unit (CSU) reportedly gives an operator the capability to connect and switch six computer communications cables to twelve modems.

The CSU supports any RS-232 connection, the company said.

Kent's Model 232A provides a lockout feature which is said to prevent operator selection of a channel modem connection in use.

Both CSUs include cable connectors for the communications channels and modem cable connectors.

The 232A costs $2,500 and the 232B is priced at $1,600, Kent Computer said from 9219 Katy Fwy., Houston, Texas 77024.

Comdata Has Acoustic Coupler

SKOKIE, Ill. – Comdata Corp. has announced an acoustically-coupled modem which provides for the transfer of data between a remote computer, a local terminal and an ordinary audio magnetic tape cassette unit.

The 302C features a carrier indicator, full- or half-duplex operation and a magnetic tape unit interface.

Storage of up to 150K characters is provided at 300-bit/sec transmission rates on standard cassettes; automatic block recording is provided when used with a buffered terminal.

The 302C costs $420 with immediate delivery, the firm said from 8115 Monticello, Skokie, Ill. 60076.

DSI Adds Paper Tape Reader/Punch

NORTHBROOK, Ill. – Data Specialties, Inc. (DSI) has a paper tape reader/punch which reportedly can attach to any terminal through the RS-232 or current loop interface.

The SRP-300 may be remotely controlled from the line or terminal through standard codes. It features full- or half-duplex operation, line/local, search/edit control, back space, tape feed and selectable transmission rates, DSI said.

The unit costs $1,995 and has a 45-day delivery schedule, the firm said from 3455 Commercial, Northbrook, Ill. 60062.

Different Net Brings Benefits

Former Datran User Finds Speedy Relief

By Ronald A. Frank
Of the CW Staff

CHICAGO – The demise of the Data Transmission Co. (Datran) has led at least one former customer to find speedy relief to his network problems.

Polysystems, Inc. had been a Datran user operating a network in Dallas, New York and Chicago. The company provides actuarial software programs to accounting firms which utilize the dual Burroughs B6700 mainframes at Polysystems' DP center here.

Polysystems had previously undertaken a study to seek alternative network suppliers, according to Guy C. Nadeau, the firm's president. The company had already tentatively decided the Tymshare network could provide expanded geographic benefits and a lower operational cost than Datran.

As a line carrier, Datran was a technically good company, but it is difficult for a small user to deal with many different vendors and it is not economical to set up an in-house network, Nadeau said.

"Datran was so much superior to the Bell Telephone System and I would still use it today if it were in certain cities," he said.

In dealing with the earlier Datran arrangement, the company encountered "unreal complexities" because many suppliers had to get involved, Nadeau said. Although no modems were required on the Datran lines, the access local loops needed data sets and required interfacing with local phone companies.

The earlier network worked well and was reliable from a technical standpoint, but Polysystems had the tasks of coordinating network arrangements with various equipment vendors and telephone companies as well as Datran, Nadeau said. Equipment included modems from International Communications Corp. and a Timplex multiplexer.

With Tymshare, Nadeau expects to have an easier time since his new network supplier will act as the main interface to see that all portions of the network are operating. For a small company such as Polysystems, Nadeau said, this is a definite benefit.

Switch Not Difficult

After being notified that Datran service would be terminated [CW, Aug. 30], the switch to Tymshare was accomplished with few problems. Tymshare installed a Tymcom processor (a special version of the Varian 620/I) and arranged for all telephone company links to the nearest Tymshare network office in Chicago, Nadeau said.

These local digital circuits will allow Polysystems to handle about 30 lines from users dialing into the Burroughs CPUs to access the accounting programs, he added.

One advantage for the company is that more customers will be able to dial into the network since Tymshare provides dial-up access in a larger area than was available with Datran. Also, with its larger network geography, Tymshare will be able to utilize alternate path routing in the event of circuit failures, Nadeau believes. Datran could not do this since its network covered a limited area.

Initially Polysystems will be paying about the same total bill each month to Tymshare as it did to Datran. But savings will come from not having the operational problems of continuously testing lines, and there will be no finger-pointing sessions between vendors, Nadeau said.

In addition, the actuarial programs for Polysystems' customers will be available in 80 cities, which will probably mean an expansion of business for the company, he added.

Polysystems' customers access the actuarial programs in Chicago using their own terminals. The B6700s support incoming data transmitted at speeds from 110- to 9,600 bit/sec.

About 18 to 20 users are accessing the actuarial programs daily and Polysystems estimated it will be using about 600 hour/mo on the Tymshare network.

Telecommunications Seen Key To Social Service Optimization

By Toni Wiseman
Of the CW Staff

LOS ANGELES – Civic and social services that have already been improved by means of DP applications are being expanded and optimized even further by telecommunications, participants concluded at a recent session at the Western Electronic Show and Convention (Wescon) here.

Consultation between a physician "provider" and a physician, nurse or patient "consumer" via an electronic communication line becomes justified, for instance, when travel of the provider to the consumer is impossible or too expensive, according to a paper presented at the session.

The paper, written by several doctors from Case Western Reserve University, asserted that even in the inner city, telemedicine can be justified where a small institution lacks specialists that are readily available in a large medical center within the same city.

"The quick consultation available through telemedicine makes accessible the highly specialized consultant on short notice without disrupting the consultant's routine activities in the large center more than would a consultation with an additional patient in the large medical center," according to the paper.

The Cleveland telemedicine network described in the paper consists of a central monitoring facility located in the university's hospital (UH) and three remote camera locations, including an operating room of the Veterans Administration Hospital (VA), an operating room of Forest City Hospital (FCH) and a mobile camera that can operate from any of five locations in the FCH (operating rooms, intensive care units, delivery rooms, newborn nursery.

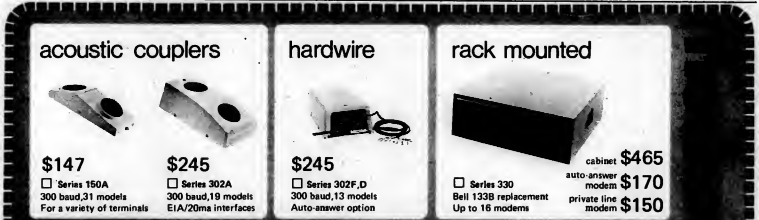
Two-way audio-video laser communication systems connect the remote camera sites to a tall dormitory building of Case Western Reserve, it noted. A closed circuit television system is used to complete the connection to the monitoring facility at UH. The camera site at FCH is also connected to the monitoring facility directly by microwave.

Law Enforcement

Public safety agencies are also benefiting from innovative telecommunications advances, according to Robert L. Sohn of the Jet Propulsion Laboratory at the California Institute of Technology.

Computer-aided dispatch, mobile digital communications, automative vehicle loca-

(Continued on Page 30)



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Telecommunications Seen Key To Social Service Optimization

(Continued from Page 29)

tion and direct data file access are a few of the advances this technology has made possible, Sohn said.

Others include digitized voice entry and response, the 911 emergency telephone number and rapid, comprehensive management reporting, he added.

"These innovations have come upon the scene in the past few years, but are attracting widespread interest for two reasons. First, low-cost computers, digital communications equipment, vehicle locator systems and supporting software are coming into the marketplace," Sohn said.

"And secondly, strong pressures are being exerted on public safety agencies to maintain and even improve their effectiveness under severe budget and manpower constraints, to increase the level of service to the community and to enhance the safety of their personnel," he said.

Of the several innovations in command and control, computer-aided dispatch has the most direct impact on operations within the dispatch center because a manual system is replaced with one in which all data is entered directly into a computer system, he stated.

Incident report cards, conveyor belts and manual field unit status boards are dispensed with, he added.

Among the many benefits to be derived from computer-aided dispatch are reduced response time, primarily by reducing the time between receipt of a call for service and assignment of a patrol unit; and enhanced officer safety because more information is made immediately available, Sohn said.

A typical system would include a central processor, a data base system and keyboard display terminals for complaint-board operators, dispatcher and support personnel.

The data base itself contains several files including:

- Incident records – a log of each incident from initial call to log of final disposition.
- Status of field units – a summary of the status, assignments and availability of vehicles.
- Geo- or address file – a listing of all addresses to the block level within the jurisdiction.
- Personnel – a log of personnel status and assignments.
- Dangerous situation – a file of addresses of dangerous persons and places.
- Vehicle and crime information – lists of stolen vehicles, wants and warrants, including local files, department of motor vehicles and the National Crime Information Center.

Obvious Advantages

"Computer-aided dispatch systems cannot perform functions that are not possible with conventional manual systems," Sohn stated. "But there are obvious advantages in capturing all data in real-time such that situation and activity reports are immediately available to command and control system managers.

"Better utilization of resources in day-to-day operations is certainly made possible through this capability.

"And, in the long term, a modern management reporting system provides a means or tool by which agencies can develop better strategies and procedures for use of their resources, based on more accurate and timely identification of needs; as with crime patterns," he stated.

Automatic vehicle monitoring (AVM) and Identification (AVI) are becoming increasingly important as users, such as government agencies and private firms, desire a capability to monitor hazardous, sensitive or valuable cargo in cross-country transit.

Generally, the users desire low-cost equipment, position location accuracy of less than 300 feet to a few miles, an updating rate of once very 15 minutes to two hours and a capability for instantaneous alarm in case of emergency, according to a paper jointly presented by J.S. Bravman of Fairchild Space and Electronics Co. and S.H. Durrani of Nasa-Goddard Space Flight Center.

They discussed several systems including a baseline system for highway applications in which each vehicle obtains information through a Loran-C receiver in rural areas and through a "signpost" or "proximity"-type sensor in urban areas. The vehicle transmits this information to a central station via a communication link, they said.

"In an advanced system, the vehicle carries a receiver for signals emitted by satellites in the global positioning system and uses a satellite-aided communication link to the central station," they noted.

An advanced railroad car monitoring system, on the other hand, uses car-mounted labels and sensors for car identification and cargo status. The information is collected by electronic interrogators mounted along the track and transmitted to a central station, they said.

"All these systems permit the use of low-cost user equipment which can be developed from presently available hardware," Bravman and Durrani stated. "Satellite-aided communication links from remote mobile terminals can be established for security reasons or if the system is shared by other types of applications."

A system to meet the vehicle monitoring requirements over the continental U.S. is technically feasible, they concluded, but it will require a sufficiently large market to reduce the cost of user equipment through mass production.

Modems Have Micro Technology

MIAMI – International Communications Corp. (ICC) has introduced two 4,800 bit/sec modems with microprocessor technology. The MPS 48 and MPS 48 Dial were designed to reduce line equalization time for efficiency, the firm said.

The modems equalize dial-up lines and dedicated point-to-point or multidrop lines in 26 msec while operating at 4,800 bit/sec. Conventional 4,800 bit/sec modems "generally require at least 50 msec clear-to-send time to achieve equalization," ICC said.

Remote test features are available on the units for either point-to-point or multidrop networks. This reportedly allows the user to isolate system faults from the central site without involving personnel at remote sites.

The modems are tolerant of widely varying line conditions and operate with low error rates in both dial-up and multidrop polling systems, ICC claimed.

The MPS 48 is available at a cost of $4,950 with test options and with lease plans ranging from six months to five years, according to a spokesman. A 24-month lease is $130/mo, he added.

ICC is at 8600 N.W. 4t St., Miami, Fla. 33166.

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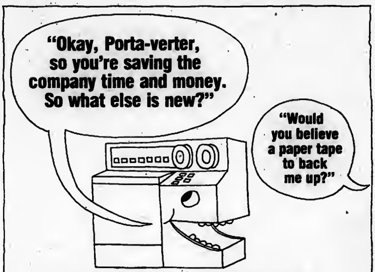
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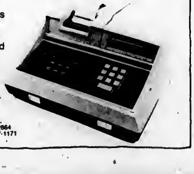

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On-Line System Helps Hospital Cope With Growth

WATERLOO, Iowa – A Midwest hospital has inaugurated an on-line system to cope with its rapid increase in outpatient service needs.

Schoitz Memorial Hospital, a 325-bed community facility here, has enormously increased its outpatient services in the last three years.

In the 1972-1973 fiscal year outpatient visits grew 10% over the prior year. But for fiscal 1974, it increased 29% and in fiscal 1975 it was up by 57%.

One reason for this growth in outpatient care is attributed to the discovery by insurance companies of economies in outpatient care as opposed to inpatient treatment, according to Raymond Burfeind, associate administrator at Schoitz.

"For many years the insurance firms felt that if their plans included outpatient care they would be swamped with bills for treating minor ailments," Burfeind said, adding most plans now have built-in safeguards against unnecessary visits.

Medical Information System

Schoitz recently implemented an on-line medical information system utilizing Univac Uniscope 100 CRT terminals to link various departments to its Univac 90/30 central system.

After substantial advance preparation and program conversion, the 90/30-based system was installed last February and began operation almost immediately without any parallel running of programs, Burfeind noted.

Nurse enters patient treatment data into terminal in radiation therapy department.

The system has a main memory of 131 bytes, integral card reader, punch and printer, and five Univac 8418 disk drives with a total storage capacity of 290M bytes. Three keypunch units and seven Uniscope 100 display terminals, of which three are equipped with attached printer units, complete the present system, he said.

Two of the terminals are located in the outpatient department. The others are individually sited in the laboratory, radiology department, radiation therapy, physical therapy and computer rooms.

The decision to acquire the 90/30 was made in 1975 when plans were formulated to deal with the rapid growth of outpatient services, Milt Hahn, DP manager, noted.

The Univac 9300 CPU in use then did not have the capability to service an on-line system. The hospital investigated computer systems manufactured by the major vendors to find the best one for its needs, Hahn said.

Use of the IMS/90, Univac's interactive transaction-oriented file management system, allows files to be accessed and modified on-line, Hahn said.

Displayed data can be limited to the specific information needed and the system eliminates the requirement for many lengthy paper reports. By using passwords, access to files under the IMS/90 also can be limited for security purposes, Hahn indicated.

"For years, we had been geared-up to handle inpatient information with reduced emphasis on outpatient services. Now with the rapid growth of outpatient work we had to put the full resources of DP to work to collect information in a timely fashion and to get a handle on outpatient costs," Hahn said.

"We justified the 90/30 acquisition to the hospital board on outpatient work alone," he noted.

Under the old method, the patient was given an envelope and a plastic nameplate containing personal and insurance information. The patient would then go to one or more departments where a prepunched card would be pulled.

After the charges were inserted the cards were added to the folder and the envelope was returned to the business office for review.

Finally, the cards were sent to the DP department for editing and entry into the system, Hahn explained.

"We found that this system was too unwieldy. The envelope or some of the cards could get misplaced or lost. Sometimes it took two or three days to get the information into the system, while the patient may have completed his hospital visit in under 20 minutes," Hahn said.

"Now when a physician calls the hospital to order outpatient treatment, the information is entered into the computer via a terminal at that time. When the patient actually arrives we can call up the information we need or the services requested within a few seconds on a terminal in the outpatient department," he explained.

Outpatient medical records can be accessed on-line either by name, Social Security number or a patient record number assigned by the hospital. The data bank contains information on a patient's previous visits coded to show services supplied and an identification number for each area employer providing insurance benefits.

Each service department the patient visits will input data on the services rendered and charges through a terminal. Eventually, when the system is fully implemented, authorized hospital personnel will be able to obtain an outpatient's complete record on the terminal screen and, if desired, receive a hard copy printout on the attached printer unit, Hahn indicated.

Roland B. Enos, Schoitz administrator, admitted the explosion of paperwork has left hospitals no choice but to computerize as extensively as possible.

"We couldn't possibly cope with the volume of reports required by increased government regulation and the insurance companies without the computer. It would be a horrendous job to try to do it manually," Enos said.

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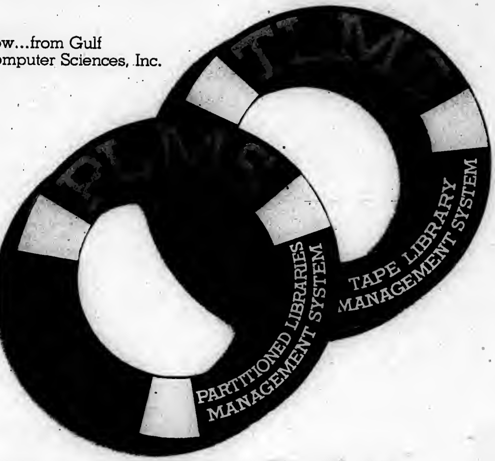
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CTS Unit Prints 240 Point/In.

PARAMUS, N.J. – Computer Transceiver Systems, Inc. (CTS) has introduced the first in a line of terminals which are said to have 136-column printout and plotting capabilities for improved graphic presentation of data.

The Execuport 3000 has a printing resolution of 240 point/sq in. (24 vertical by 10 horizontal) made possible by the simultaneous movement of the print head and paper positioning, CTS said.

Built-In Coupler

Standard features include a built-in acoustic coupler compatible with Bell 103 series modems and a built-in RS-232 interface connector, according to the firm.

Other features include switchable mode options of half- or full-duplex, local or isolated operation, error control through selectable parity generation and a choice of teletypewriter-like or multimode keyboards with numeric clusters, the firm added.

The terminal prints at 10-, 15- and 30 char./sec and accepts 80- or 136-column paper, according to a CIS spokesman.

Optionally available are an out-of-paper alarm and 20-character response generator, he added.

The Model 3000 is compatible with paper tape and magnetic tape memory units, most peripheral equipment and major minicomputers, Computer Transceiver claimed.

A standard Execuport Series 3000 costs $3,495 or $158/mo on a one-year lease and $120/mo on a three-year lease.

The lease prices include maintenance, the spokesman noted from E. 66 Midland Ave., Paramus, N.J. 07652.

HP 2640B Offers Enhancements On Micro-Controlled 'A' Version

PALO ALTO, Calif. – The Hewlett-Packard Co. (HP) 2640B is a microprocessor-controlled CRT terminal that is said to have enhanced communications, additional firmware support for peripherals and other features including a 13% lower cost than the HP 2640A.

Hewlett-Packard 2640B

The B version offers a choice of either main-channel protocol or standard reverse-channel protocol. for half-duplex modem operation, according to HP.

Terminal Transactions

Additional firmware enhancements are said to allow connection of most serial printers via an RS-232C interface and allow malfunctions of interfaced printers to be detected by a remote computer.

Keyboard layout has been improved and both absolute and relative cursor sensing and positioning have been incorporated, HP said.

Like the 2640A, the 2640B was designed to be used in both page mode and character mode operation for data entry and time-sharing applications.

Among its features are a semiconductor memory which can store over 400 lines of data that can be viewed 24 lines at a time by scrolling, an off-line data preparation and editing capability and expandability, the company said.

Built-in self-test and modular construction reportedly speed fault location and replacement of faulty components.

The terminal supports up to four separate character sets including optional line-drawing and mathematic symbol sets, HP noted.

Two additional display terminals based on the 2640B for Danish/Norwegian and Swedish/Finnish languages – the 2640N and 2640S – are also available.

The 2640B is priced at $2,600 and the 2640N and 2640S cost $2,750 each, HP said from 1501 Page Mill Road, Palo Alto, Calif. 94304.

UDS Motor Controller Used With Teletypes

PHOENIX – United Data Services Company, Inc. (UDS) has introduced a buffered idle line motor controller for use with model 33 and 35 Teletype terminals.

The computer-compatible Teletype motor controller combines the wear-saving advantage of idle line motor control with a data buffering syatem which prevents any loss of data during the time it takes the motor to reach operating speed, UDS claimed.

To eliminate unnecessary mechanical wear on the machine, the controller automatically disconnects power from the teleprinter motor if no data is being exchanged either on the transmitted or received signal line, UDS said.

On sensing the presence of data on either the send or receive signal lines, the controller restores power; at the same time, a buffer memory in the controller delays the data received by the teleprinter to allow the motor to reach operating speed, according to the company.

After start-up, the buffer is automatically bypassed at the first pause in transmission, UDS explained.

The motor controller does not interfere with external connections to the Teletype and can be used for full-duplex as well as half-duplex or simplex communications, UDS said.

The controller is priced at $129.50 for the 312 A 0545 (for the Model 33) and $137.50 for the 312 A 0546 (for Model 35).

The units are available from stock, UDS said from 3024 N. 33rd Dr., Phoenix, Ariz. 85017.

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By Cecil Wright, Assistant Director
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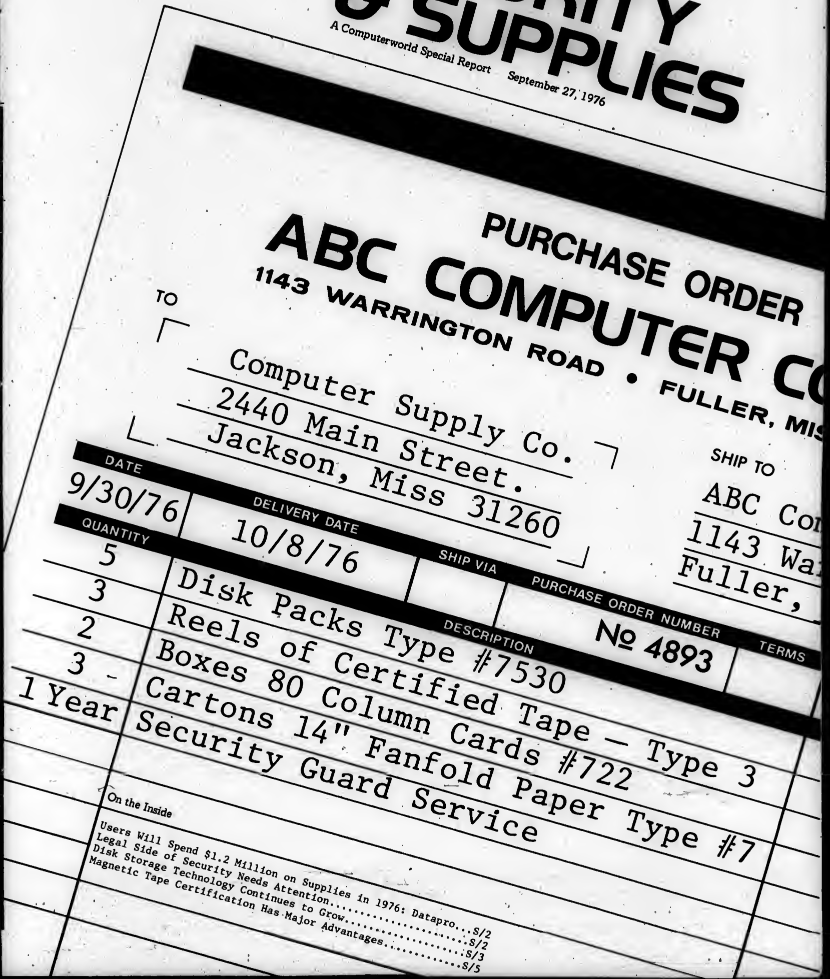
A Computerworld Special Report September 27, 1976



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Users Will Spend $1.2 Million On Supplies in 1976: Datapro

DELRAN, N.J. — Users will spend $1.2 million on DP supplies this year — 4.1% of their total DP expenditures, according to the results of a recent survey made by Datapro Research Corp.

Among users' purchases will be about 634 reels of tape per installation, Datapro said in a report covering a range of products including disk packs, diskettes, magnetic tape, punched cards and computer forms.

In preparing the report, the market research firm sent out requests for product information to approximately 200 vendors; user ratings were compiled from responses to a survey mailed to subscribers.

About 74% of these 461 responding to questions on 1/2-in. magnetic tape said they use 9-track, 1,600 bit/in. magnetic tape. The older 7- and 9-track, 800 bit/in. formats are used by 11% and 15% respectively, Datapro said.

As shown in Figure 1, not only do more of the users use 3M Co. tapes, but that company also got the most excellent and good ratings of the 10 vendors listed individually.

Philips-Style Dominates

The magnetic tape cassette market is dominated by the Philips-style cassette, which was introduced several years ago for audio recording and has "come into its own as a convenient recording medium for digital data," the report said.

Some vendors use the same type of cassette but a different recording format to provide additional capacity or other benefits.

Other small packaged tapes were termed "cartridges" because the terms "cassette" and "Philips cassette" are considered almost synonymous, Datapro noted.

Thirty-nine users, of which 13 used cartridges, reported their experience with these two media. No one vendor dominates this market, according to Datapro.

Removable disk packs, introduced by IBM in the early 1960s, have grown to dominate the direct-access storage field and have also put a crimp into the expansion of magnetic tape usage, according to the report.

The larger, multidisk units carry the label of "packs." These include the IBM 1316 (for 2311 drives), 2316 (for 2314 drives) and 3336 (for 3330 drives) disk packs.

The single-disk units, called "cartridges," include the IBM 5440 (for the IBM 3) and 2315 (for the 1130 and 1800 systems).

Similar Drives Offered

Other mainframe vendors offer similar drives which are generally capable of using the same types of disk packs or cartridges, although their data recording formats frequently differ from those of IBM, Datapro noted.

The diskette, or floating disk, is another type of removable rotating media that is intended as a low-cost, low-capacity direct-access facility, the report explained.

"The problems of mechanical structure are bypassed by using a flexible substrate and contact heads," it said.

Another disk type, the IBM 3348 data module, incorporates the recording heads into the removable disk package itself, "supposedly minimizing the problems of reading and writing with different assemblies," according to the report.

In May and June of 1975, a total of five vendors announced 3348-compatible data modules.

'Remarkably High Level'

There were 417 user responses to the survey and, as shown by Figure 2, the disk pack vendors received "a remarkably high level of overall user satisfaction with their products," the report said.

The survey form requested that users report the number of packs they acquire annually. A total of 392 installations said they use, on the average, about 18 packs per year, which is five less than last year's average, Datapro noted.

Approximately 300 users responded to the survey questions concerning forms and ribbons. Ribbon purchases averaged over 220 per year, with IBM getting the lion's share of the users.

Punched Cards

Punched cards were also evaluated by the survey and, based on the responses of 321 users, an average of about 3.1 million cards were purchased last year by each one.

"This figure is down considerably from the average figure of five million cards reported in our 1975 survey," the report said.

"The primary reason for the apparent decline is the increasing popularity of other forms of data entry," Datapro explained.

Vendor	No. of User Responses				Ratings				
	Total	By Format							
		7-tk	9-tk, 800 bpi	9-tk, 1600 bpi	WA	E	G	F	P
BASF	48	5	6	37	3.4	20	26	2	0
Burroughs	17	1	5	11	3.6	11	5	1	0
Control Data	3	1	0	2	3.7	2	1	0	0
Graham	69	6	10	53	3.6	45	23	1	0
IBM	42	2	3	37	3.5	21	21	0	0
Memorex	78	7	15	56	3.3	32	42	4	0
Nashua	5	0	0	5	3.4	3	1	1	0
Pryor	3	2	0	1	3.3	2	1	0	0
3M	118	12	15	91	3.4	62	50	3	3
Wabash	36	7	7	22	3.1	11	21	2	2
Other vendors	42	7	10	25	3.3	16	21	5	0
Totals	461	50	71	340	3.4	225	212	19	5

All Charts Copyright Datapro Research Corp.

Figure 1. User Ratings of 1/2-Inch Magnetic Tape

For this chart and those below, E=Excellent, G=Good, F=Fair, P=Poor and WA=Weighted Average on a scale of 4.0 for Excellent.

Vendor	No. of User Responses						Ratings				
		By style									
	Total	2316-1	2316-2	3336	5440	Other	WA	E	G	F	P
BASF	29	6	9	9	2	3	3.6	17	12	0	0
Burroughs	18	2	6	0	0	10	3.3	8	7	3	0
BST	3	0	0	0	3	0	4.0	3	0	0	0
Caelus	21	8	1	9	1	4	3.5	10	11	0	0
Control Data	42	10	5	15	1	11	3.6	27	14	1	0
CFI	17	2	2	8	4	3	3.6	10	5	2	0
DEC	3	1	0	0	0	2	3.3	1	2	0	0
Honeywell	5	1	0	0	0	4	3.6	3	2	0	0
IBM	56	8	2	31	8	7	3.7	37	19	0	0
Memorex	79	21	7	37	2	12	3.5	44	35	0	0
Nashua	41	7	1	28	1	4	3.4	21	16	4	0
3M	64	13	10	27	7	7	3.7	46	18	0	0
Univac	7	0	0	1	0	8	3.1	2	4	1	0
Other Vendors	32	10	2	5	7	8	3.4	14	17	1	0
Totals	417	87	45	168	36	81	3.6	243	182	12	0

Figure 2. User Ratings of Disk Packs

Vendor	No. of User Responses	Ratings				
		WA	E	G	F	P
BASF	6	3.3	2	4	0	0
Burroughs	3	3.3	1	2	0	0
IBM	30	3.5	15	15	0	0
Memorex	5	3.2	1	4	0	0
Syncom	6	3.7	4	2	0	0
Tab Products	3	3.3	1	2	0	0
3M	4	3.8	3	1	0	0
Other Vendors	15	3.6	10	7	0	0
Totals	71	3.5	37	36	0	0

Figure 3. User Ratings of Diskettes

Vendor	No. of User Responses	Ratings				
		WA	E	G	F	P
80-Column Cards—						
A.A.I.	4	3.8	3	1	0	0
Advanced Computer Supplies	5	3.2	1	4	0	0
BSC	3	3.3	1	2	0	0
Control Data	5	3.0	2	2	0	1
Data Documents	65	3.4	28	36	1	0
Globe	30	3.2	11	15	3	1
Hackett	15	3.2	4	10	1	0
IBM	88	3.6	52	34	2	0
Jersey Tab Card	18	3.5	9	9	0	0
Kelly	4	3.5	2	2	0	0
Lewis Business Forms	6	3.2	1	5	0	0
Morley	3	3.0	1	1	1	0
National Electronic Card	11	3.5	5	6	0	0
OEI	14	3.3	6	5	2	0
PDC	6	3.3	2	4	0	0
Pryor	18	3.7	12	6	0	0
Other Vendors	58	3.5	29	28	1	0
Totals	353	3.4	169	169	11	2
96-Column Cards—						
Burroughs	3	3.3	1	2	0	0
Globe	5	3.6	3	2	0	0
Other Vendors	13	3.5	7	6	0	0
Totals	21	3.5	11	10	0	0

Figure 4. User Ratings of Punched Cards

Many Facets Involved

Legal Side of Security Needs Attention

By Roy N. Freed

Special to Computerworld

Much attention is being given to the physical side of computer security — sprinkler systems, door locks, identification means, file dumps and the like. It is important and its need is obvious.

But comparable attention must be given to the legal side of security.

The legal side of security has a number of facets. It prescribes the nature and scope of the obligations of the parties to transactions, whether suppliers or users, to take security precautions of various sorts, physical and otherwise.

It also prescribes the liabilities of those parties to each other and to third persons in the event of breaches of those obligations. This particular aspect includes not only opportunities to limit or exclude liability, but also to secure indemnification commitments.

In effect, the allocation of liabilities, however accomplished, defines how the parties to computer transactions will divide between them the actual dollar impacts of the inevitable risks of loss.

The legal aspects of security must be recognized for the inherent exposures to harm and monetary loss that can exist, for the opportunities available to mitigate them or shift their impacts by conscious agreement between the parties and for the methods for working out those agreements.

Persons who manage computer transactions for either suppliers or users should achieve enough awareness of this subject, at least to identify exposures to loss and opportunities, in order to know when to call in professional legal help.

In any event, they should be able to recognize, from time to time, how much they do not know and should be wary of ever trying to handle the entire subject alone. The pitfalls and risks are too great to take that chance.

Meaning of 'Security'

"Security," or "computer security," has a much broader meaning than has been acknowledged thus far. It really means freedom from practically all types of harm resulting from or related to the use of a computer.

That harm might be suffered directly by a computer user. Its impact might be felt by a supplier to a user. Its impact also might fall on a third person to a transaction, such as a passenger on a computer-controlled vehicle or a patient on whom a computerized intensive care unit is used.

The harm might be experienced with respect to physical things, like hardware or bodily injury, or to intangible things, like a tarnished reputation, loss of profits, business interruption or a duty to pay money.

It is impractical to take a more limited view of security in a legal context because the same legal approach for each aspect applies to all the others.

There can be a number of legal duties, or responsibilities, that require taking precautions, with different sources and different degrees of compulsion to perform them. Some exist automatically when the parties fail to act — nonaction can itself represent the making of a decision respecting the applicability of security obligations.

However, by skillful handling, the parties can mold those duties to their particular needs. There are many opportunities to do so. Their enjoyment requires not only a knowledge of how to handle the legal duties, but also the ability to identify wisely the need for them in individual situations.

(Continued on Page S/4)

Disk Storage Technology Continues to Grow

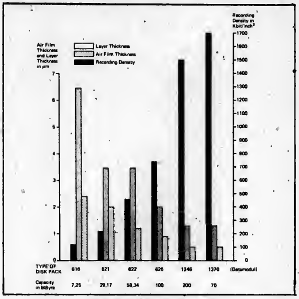
By Guenter Mallmann
Special to Computerworld

As a rule, the DP user is only interested in the fact his computer runs smoothly. A dissertation on how it works and on what technological master strokes it is based understandably leaves him cold.

But the development and line production of the latest generation of disk packs — the 200M-byte packs and data modules — have again extended the already breathtaking technology of computer scientists and engineers. They seem close to the absolute limit of physical possibility.

Does this mean disk technology reached the end of its road? Does it have any prospects of remaining DP's economical and "fast" storage medium over a prolonged period?

Remember when interchangeable disk storage first appeared, less than 15 years ago? Coating thicknesses were in the order of a few thousandths of a millimeter. The first line produced magnetic disks of the kind we know today.



Increase of Recording Density Depending on Layer and Air Film Thickness

For example, the magnetic disks for the IBM 1311 disk drive introduced in 1962 had the then-improbable coating thickness of 6 micrometers. The recording density was 1,020 bit/in., the track density up to 50 track/in. and the required rotational speed was 1,500 rpm.

The air cushion on which the read/write head flew over the disk surface was 4 micrometers thick. In order to achieve this "flight altitude," which could not be exceeded without loss of signal, the surface smoothness had to be within limits which, until then, had hardly seemed imaginable. With a clearance of 4 micrometers, a ridge the size of a smoke particle would have caused direct contact with the head; conversely, a scratch the same size would have caused a signal failure.

Besides the surface under the read/write head, the entire disk had to be free of irregularities. During rotation, any irregularity on the surface causes axial disk deflection (axial run-out). This forces perpendicular movement toward the read/write head and can lead to wobbling or even head crash.

Years of laboratory research preceded these first-generation disk packs, but at first it was applied only to drum storage. The idea of not leaving the read/write heads in physical contact with the surface, but making them glide on an air cushion, was developed for drums in 1954.

A few years later, the experiments were extended to disk storage. IBM did pioneer work here as it made further developments of disk storage technology.

Next Technology Stop

The specifications which characterized first-generation magnetic disks and associated storage devices still defy the imagination of laymen, yet the next stop in the history of disk storage technology progressed far beyond these parameters.

Coating thickness was an average 3 micrometers and clearance was 2.5 micrometers. Track density was improved to 100 track/in., recording density to 2,200 bit/in. and the rotational speed was raised to 2,400 rpm.

As far as disk technology was concerned, this advance was astonishing enough, but it was only a sign that manufacturing methods had been mastered. On the equipment side, the step taken was perhaps even greater.

The increased track density made highly sensitive position-detection devices necessary and, at the same time, the advantage of the higher transfer rate necessitated reducing access times.

Ultrathin Coated Disks

Development did not stop there. Next came ultrathin coated disks with a recording density of 4,040 bit/in. and a rotational speed of 3,600 rpm: the 100M-byte pack.

Coating thickness and head

This data module testing device records endurance of head towers with the objective of testing material wear.

clearance were reduced again. Average coating thickness became 2 micrometers — one-thirtieth the thickness of a human hair — and "roughness value" became .04 micrometers, which meant all peaks which extended above a mean height had to be mechanically removed.

The technical possibilities for positioning the read/write heads had been exhausted with the previous generation, so new ground had to be broken. The pack itself was made directly responsible for positioning.

Until then, technical devices, such as the track position transducer, had controlled head positioning. These were delicate components which required a lot of servicing and could cause problems of compatibility with different drives.

It must be remembered that, with these ultrathin coated disk packs, heads had to be positioned on tracks only 100 micrometers apart. Even slight temperature differences between different drives

(Continued on Page S/6)

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Complex Legal Side of DP Security Needs Attention

(Continued from Page S/2)

Statement of legal duties to observe good security practices can be found in various places. These include, primarily, the common law rulings of courts in specific cases, statutes enacted by legislatures and provisions in written or oral contracts entered oral contracts entered into between parties to transactions.

Statements of legal duties relating to security can be encountered in a wide variety of circumstances and under many guises.

For example, courts say banks and physicians have implied contractual obligations not to disclose to third persons information received from their customers or patients, regardless of the types of systems used to keep their records.

The "implied contract" fiction is simply a contrived basis for a "thou shalt not" legal rule enforceable with penalties of some sort. The reference to the legal concept or symbol "contract" can give important messages respecting the applicable yardstick for measuring damages and how long an injured party may wait before suing.

Because of the circumstances under which the specific reported cases arose in those two areas, it is not clear yet whether the duty is absolute (so damages must be paid if any unauthorized disclosure occurs) or whether it merely requires reasonable measures to avoid unauthorized disclosure (with no penalty if disclosure occurred).

Courts also say that corporate directors have a duty to guide their corporations with the same care they would use in their personal business affairs in order to spare those corporations avoidable losses of various sorts.

Courts also hold that manufacturers and suppliers of products, which would include computer systems, are liable for harm resulting from their use.

Avoiding the Courts

In light of the potential sources of legal obligations respecting security and the related financial losses resulting from breach, persons with potential exposure should recognize the importance of treating the subject specifically in written agreements.

That approach can be far superior to abdication of the decision-making process to courts. The scope of court decisions are functions of the degree of sophistication with computer technology possessed by the judges and lawyers involved.

In some cases, the risk to the parties from resorting to that forum is unreasonably great. The parties should try their hands at defining their relationship voluntarily.

Of course, the obligations to provide security have genuine significance only in terms of the actual penalties suffered for their breach. What is the likelihood that some burden will fall on a violator and how large can it be? Will it be only in money or can actual compliance with obligations be compelled?

Unless a security breach constitutes a crime, a person harmed is ordinarily entitled only to dollar damages to cover monetary loss.

In some special cases, however, a party might be entitled to a judicial order compelling compliance with security precautions in order to avoid a breach from occurring or to minimize the impact of one that happened.

This means the person claiming harm and entitled only to money damages, if anything at all, must bring a lawsuit, establish a legal basis for his claim and prove the amount of legally allowable damages.

Except where the damages are substantial, this burden is enough to discourage all but the most hardy claimants. By the same token, it gives the person exposed to potential liability encouragement to gamble on the chance that it will suffer no significant penalties.

It is unlikely criminal penalties will be authorized to any substantial extent, but they do apply to some thefts of trade secrets, which covers many kinds of software programs.

Shifting the Impact

In light of these realities of legal remedies, it is essential to assess the actual net impact a security breach could have and to plan strategy accordingly. There are a number of tactics that can be taken to shift the impact of security breaches.

These must be tailored carefully in light of whether the person considering them is a user or supplier.

The financial impacts of security breaches can be shifted to others in various ways by a careful party that has some bargaining power and uses it skillfully. The means for that shifting primarily include securing outside insurance, securing indemnity commitments from the other party and fixing liability at some level, which could be zero.

It should be recognized that those means are not mutually exclusive. They may, and should, be used in combination, tailored in each case to the basic relationship negotiated by the parties.

Indemnification Approach

The most obvious measure for risk shifting is insurance. Both users and suppliers should consider it. A wide variety of coverages are available to users, including those for equipment losses, computer media losses and business interruption consequences.

The hope, and normal expectation, in buying insurance is that the insurer will be solvent when a claim has to be made. It is possible, in many situations, to get comparable commitments from the other party to a procurement-marketing agreement, but not always with confidence that the committing party will be able financially to honor them.

An indemnification commitment is only technically or superficially different from a regular contractual promise. Each party can be liable to the other by virtue of a wide variety of direct contractual promises; an indemnification obligation is just one form of such promise.

It probably relates particularly to a promise to reimburse a party for amounts it must pay to third persons for one of various reasons. That type of commitment is encountered most commonly as an obligation running from the supplier to the customer in connection with potential patent and similar infringement.

It also could be appropriate if a certain type of computer use exposes the supplier to lawsuits with little likelihood of legal validity.

There are many ways in which the parties can limit liability by express agreement.

Freed is an attorney with Powers & Hall in Boston and a regular contributor to Computerworld.

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In the Short and Long Run

Magnetic Tape Certification Has Major Advantages

By Miles D. Bender
Special to Computerworld

What is magnetic computer tape certification?

Webster defined "certify" as "to assure or make certain." Therefore, to certify magnetic computer tape to zero errors is to assure or make certain the reel of tape has zero errors.

This is generally done on a tape certifier and is accomplished by saturating the magnetic tape or writing on it with 100% of a signal and instantaneously reading it back to see whether a parity is achieved.

Normal industry standards call for reading back at least 50% of the signal at 800 bit/in., 35% of the signal at 1,600 bit/in. and 40% of the signal at 6,200 bit/in. All of the specifications give a reasonable margin of safety on any normal computer.

Most computers are set so they will read back a signal and receive parity as long as they can read between 12% and 20% of the original signal placed on the computer tape.

Proper Certification

Proper certification itself most closely parallels actual computer usage of magnetic tape.

During certification, a tape is retried several times before it is established that an error or bad spot exists which is unable to be read back. Certifiers generally retry three times.

This may be a temporary or nonpermanent error which can be normally corrected by a certifier operator. Computers may be set to retry as many as 50 to 100 times before an actual error or lack of parity is established.

Most certifiers have vacuum towers which most closely simulate a computer in establishing the tape-to-head contact pressure.

Several Combinations

Certification can be done using several combinations of read/write heads. Generally, the write head covers the entire surface of the tape and saturates the tape with the 100% signal.

Total surface certification is the use of 5/4 overlapping read heads which cover the entire surface of the 1/2-in. computer tape, including that area out to both edges of the tape.

This is called total surface certification and certifies the entire surface of the tape, leaving no areas of the tape uncertified, including the outer edges where deterioration and problems can originate.

Full-width or track or channel certification is the certifying of specific channels used for the recording on the tape — such as 7-track, 9-track or, in some cases, a combination head using both simultaneous certification of the 7- and 9-track tape.

This type of certification leaves much still uncertified. In the use of a simultaneous 7-and 9-track tape, certification still leaves approximately 18% of the tape uncertified, including the critical edges of the tape.

Certification is the examination of a tape in a manner most similar to its actual use on a computer.

While complete certification is falling out of favor with most manufacturers for various reasons, including the declining price of magnetic computer tape, Syncom, Inc. feels it is extremely important in both the short and long run to the computer user. Consequently, Syncom certifies to zero errors each reel of tape it sells.

With the advent of the new high-speed drives, including the super high-speed rewinds, and the advent of higher and higher packing densities, the necessity for a complete certification becomes critical.

Reduction of immediate problems and, particularly, long-range problems that result from high-speed drives and higher packing densities will make total certification more and more important.

The purchase of a fully certified tape, despite its slightly higher cost, will save countless dollars in problems, computer time, rerun time and, possibly, in the extremely costly recreation of important data.

Confusion of Words

Today in our industry, instead of full certification, we are finding a confusion of words which perplex the end user. Phrases such as "fully tested," "fully evaluated" and "totally tested" are the most common ones that have cropped up in our industry of late. However, none of them means "fully certified."

Certain manufacturers optically scan tape after it is coated, but before it is slit into 1/2-in. widths, looking for gross imperfections and missing oxide.

Some manufacturers batch test their computer tape, i.e., testing but not certifying 10% or some similar number. If the 10% sample looks pretty good, then the entire batch is considered to have passed the test.

When the war of words is over and the new, more sophisticated high-speed computers and higher packing densities have been on the scene for a reasonable period of time, total certification of magnetic computer tape is going to become a necessity.

Anything less is going to be extremely costly in the long run and might jeopardize the security of the valuable data which has been entrusted to the magnetic computer tape.

Bender is president and chairman of the board of Syncom, Inc. in Orchard Park, N.Y.

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Disk Technology Hasn't Reached the End of Its Road

(Continued from Page S/3)

and disk packs, combined with the increased data, could mean a pack written on one drive could not be read on another.

A further difficulty with this positioning device was head alignment: for trouble-free processing, all heads in the head tower had to be located absolutely vertically above one another.

In 100M-byte disk packs, it was possible to eliminate at least some of these problems by transferring positioning to a servo surface in the center of the pack.

The step to 100M-byte capacity was also made possible by changing the recording process of the 100M-byte drives.

So far, from 29.17M-byte packs up to 100M-byte packs, development followed a relatively straight line — technological evolution rather than revolution. And now this technology reached its limit.

Further capacity increases would require new methods. When double-density packs (200M-byte capacity) and data modules (also called Winchester packs) came on the market, not much was said about technology. For the user, transition to the new packs which doubled or more than doubled capacity was perhaps less sensational than previous developments.

That was true at least for the standard disk pack, but somewhat less true for the data module, which was distinguished by a new design with both disks and read/write heads sealed in the module.

Behind unpretentious types of designations, however, such as IBM 3348 or BASF 1370 (both data modules) and IBM 3336-11 and BASF 1246 (both 200M-byte packs), was a bundle of technological innovations, especially with regard to the coating.

Development has concentrated on increasing capacity because the daily quantity of information received grows in two respects: first, through the purely numerical increase in certain units (more customers, more stock items, more accounts, etc.); and second, through the transfer of more and more business processes to the computer, i.e., in banking, in supermarkets and in medicine.

If storage capacities had not grown at the same time, there would be whole warehouses full of disk packs and armies of operators would be lost in row upon row of disk drives. This is quite apart from the fact that faster, more powerful computers can only be economically utilized if they have higher on-line capacities.

So the demands on technicians and scientists were clear: they had to design disk systems which could record and supply even more data, even more reliably, even more quickly.

The starting point for this new generation of disks was equally clear. Increased capacity could only be achieved by a decisive improvement in the disk manufacturing process and it had to cover every single stage of production.

More precisely, ways had to be found to build up a magnetic coating to a thickness between 1- and 1.5 micrometers and with a roughness so minimal that the read/write heads would be able to maintain stable flight at the height of .5 micrometers.

A coating thickness of 1- to 1.5 micrometers requires a substrate which itself has a roughness value already more stringent than that of the coated surface of the previous generation of disks.

This means there must be no peaks or pinholes on the surface of the aluminum disk deviating from an imaginary ideal line by more than .02 micrometer. In previous generation disks, this value was twice as high.

Naturally, the machines which had been perfected over years of development for machining the aluminum plate which serves as a substrate no longer satisfied these performance criteria. So the whole technology of substrate machining had to be changed, starting from the automatic lathes right through to the grinding and polishing machines.

But coating dispersion — the mixture of iron oxide particles, solvents and lacquers — also had to be developed to new formulas using new starting materials. With the size of an oxide particle about 1 micrometer, a coating thickness of 1 micrometer of the spaces between the particles posed a danger of being too large and leading to loss of impulse.

At the same time, requirements for greater abrasion resistance and adhesion had to be met. Friction also had to be reduced between the head and the disk when they came in contact with each other.

The coating itself, 1 micrometer thick at the inner radius and 1.5 micrometers thick at the outer radius, is the real stumbling block in the whole process. The dispersion has to be applied to this thickness in one operation and the magnetic particles must be oriented at the same time.

The subsequent machining of the coated and oven-hardened disk is another delicate process. Here, as with the substrate, the last irregularities in the .1 micrometer range must be ground off. The surface roughness average is .02 micrometer, which sets the standard for the process.

The subsequent steps of disk pack assembly are not new, but are more costly because of the increased expense of inspections and intermediate measurements with a whole series of specially developed measuring instruments.

The high storage densities of these disks are primarily the result of new disk technology — new in almost all stages of the production process. On the equipment side, there has been less further development of traditional disk drives with compatible disks.

With the ultrathin coated disk, the disk coating has reached its limit in the present state of knowledge.

In television engineering, however, disks coated with metal alloys have been used for years for slow-motion shots, such as the instant replays for sports events. The coatings on these disks are .1 micrometer thick, in comparison with 1 micrometer of the ultrathin coated disks.

In laboratory tests, recording densities between 12,000- and 20,000 bit/in. have been achieved. The technical production of such disks with various coatings (magnetic alloys) is possible in various ways — by an electrochemical process, by sputtering, by decomposition of volatile metallic compounds and so forth.

On the equipment side, a further improvement of the read/write heads, which would also permit significant increase in recording density, is conceivable.

In any case, the disk still seems to have a good future as a cost-effective mass storage device. Disk technology has not reached the end of its road.

Mallmann has been with BASF in West Germany since 1972.

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SYSTEMS&PERIPHERALS

Bits & Pieces

Off-Line Plotting System Prepackaged by Gerber

HARTFORD, Conn. – The Model 6242 Data Superplotter system is a prepackaged off-line plotting system from Gerber Scientific Instrument Co.

Using the Model 42 Superplotter and the 6200 plotting system control, the system features stationary motors and minimum inertia; plotting speed is 42 in./sec, Gerber said.

The Series 6200 uses microprocessor technology. Input is standard 1/2-in. magnetic tape with either 800- or 1,600 bit/in. densities.

Programs for the 6200 reside in read-only memory modules so there is no need for program loading, Gerber said.

The system costs $52,300 from the company at P.O. Box 305, Hartford, Conn. 0610t.

AKS Has Training Package

NEW YORK – "New Equipment Training" from Advanced Keyboarding Systems (AKS) is said to be a comprehensive training program for conversion from old to new data entry equipment.

The program takes into consideration productivity and schedule maintenance, AKS said, and features customized functions which address the particular aspects of the data entry equipment involved.

Supervisor and operator training are also included.

The package costs about $150 per operator for a minimum of 10 operators. Prices fluctuate according to the installation, the company noted from 437 Madison Ave., New York, N.Y. 10022.

Formatter IEEE-Compatible

SAN DIEGO – A buffered magnetic tape formatter said to be compatible with the Institute of Electrical and Electronic Engineers (IEEE) standard bus is available from Dylon Corp.

The Model t05tA allows the user to add an industry-standard magnetic tape drive to the general-purpose interface bus and provides asynchronous data transfer to and from recorders made by Cipher, Pertec, Wangco and Kennedy, the vendor said.

The unit, featuring read-after-write error checking with automatic correction, is controlled by a dedicated microprocessor.

The Model t015A is available in 7-track, 9-track and 9-track phase-encoded models and can be rack-mounted. The 7- and 9-track models cost $2,895 while the phase-encoded model costs $3,895.

The unit will be available in November, Dylon said from 7854 Ronson Road, San Diego, Calif. 92ttt.

Supports IBM Native Mode

Memorex Subsystem 3350-Compatible

By Esther Surden
Of the CW Staff

SANTA CLARA, Calif. – The 3650 direct access disk storage subsystem from Memorex Corp. is a device that is plug-to-plug compatible with the IBM 3350 and offers software support not available from IBM, according to a Memorex spokesman.

Designed for IBM 370/t35 through 370/168 systems, the disk subsystem uses Winchester-type technology; the media, read/write heads and circultry are all located in a removable unit, the firm said.

In addition to standard tBM software support, Memorex optionally supports the 3650 under DOS/VS in all modes of operation and offers OS/370 Native Mode support, a capability only recently announced by tBM, a spokeswoman said.

The subsystem consists of four models: the 3650 direct access storage model; 3653 storage module and controller; 3654 storage module and alternate controller; and the 3674 control unit.

The 3650 dual-spindle storage module can contain 635M- or 3t7.5M-byte/spindle with a transfer rate of 1.198M byte/sec, Memorex said. An optional fixed head allows zero seek time for 1.14M bytes of the 3t7.5M byte/spindle.

A typical subsystem includes a 3653 storage module and controller and three 3650 storage modules. Users may substitute the 3654 storage module and alternate controller for one of the 3650s to provide duplicate control electronics for string protection, Memorex noted.

With the 3674 storage control unit, users can attach one to four 3653 modules and controllers and up to 12 3650 modules, allowing one 3674 to control up to four strings of drives with eight drive/string, the company added.

Memorex 3650

The Memorex 3653 can be directly attached to the IBM 370 CPU through either the 3674 storage control unit or the tBM 3820-2 storage control unit.

Memorex and tBM drives can be intermixed when attached to the IBM controller on a string-by-string basis, but IBM drives are not supported on the Memorex controller, the spokesman added.

At the time of installation, users can select either Native Mode, Memorex 3670 compatibility mode or Memorex 3675 compatibility mode under OS/VS; under DOS/VS, only the 3670 compatibility mode is available.

Native Mode provides a capacity of 3t7.5M byte/spindle; 3670 compatibility mode provides t00M byte/spindle; and the 3675 mode provides 200M byte/spindle, Memorex said.

The subsystem will be available in the second quarter of 1977. Memorex has not yet released prices for the 3650, a spokesman said, but they will be "competitive."

Memorex is at San Thomas at Central Expressway, Santa Clara, Calif. 95052.

Third-Party Maintenance Eases Mixed-Vendor Site Operations

MANCHESTER, Mo. – The Archdiocese of St. Louis has had one less cross to bear since it took advantage of third-party maintenance of its mixed-vendor system, its DP director Indicated.

The archdiocese decided to buy independent peripherals for its IBM 360/30 because it found it could get products equivalent to those of tBM's, "if not better, for the same amount of money," Kenneth C. Halveland said.

When the mixed system was first implemented, each piece of equipment – the 360/30 CPU, 140t N1 printer and 250t card reader from IBM, disk drives from Control Data Corp. and tape drives from Telex Corp. – was maintained and repaired as necessary by its own manufacturer.

This arrangement required scheduling the three different service representatives every few weeks, Halveland recalled.

The DP department, located in this St. Louis suburb, also experienced some costly delays in getting the equipment serviced. "We were considered a very small customers to three separate vendors," Halveland said, so the archdiocese decided to go to third-party maintenance.

Two maintenance companies were considered by the department – Raytheon Service Company (RSC) and Sorbus. "Six months before we chose Raytheon, we considered Sorbus, but it wouldn't take all of our peripherals. It would accept everything but the Telex tape drives, and we didn't feel there was any real advantage in switching from three service companies to two," Halveland said.

RSC, on the other hand, agreed to service the entire system, and the scheduling problem has been eliminated.

"A main concern of changing to third-party maintenance was the availability of parts from all manufacturers. We have found this to be of minimum concern, because RSC stocks more parts and has been able to obtain faster service from manufacturers than the archdiocese could," Halveland added.

(Continued on Page 35)

Negotiations – Part 1

Interdisciplinary Team Necessary

By Joe Auer
Special to Computerworld

The first step in optimizing computer negotiations is to form an interdisciplinary negotiating team. Members should consist of top DP management personnel, legal counsel with some degree of computer law expertise, a financial analyst with as much computer finance experience as you can find and – very importantly – a member or two from top management of your company.

This article, the first of three in a series about optimizing computer negotiations, deals with the formation of a negotiation team.

The negotiating team's leader should be in a position in the company to effectively direct a major business undertaking. His general responsibilities are to develop and direct the negotiating strategies, assign and monitor specific tasks that are to be accomplished through the scheduling of other team members and direct the actual implementation of the negotiating strategies.

In developing the strategies for negotiations, the first thing the team leader does is to break the requirements down to task-oriented procedures and assign the tasks to individual team members and the team as a whole on a timeframe basis.

(Continued on Page 34)

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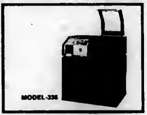

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Interdisciplinary Team, Data Collection Needed in Negotiating With Vendors

(Continued from Page 33)

An unplanned situation could result in sitting around a big table for 12 to 14 hours a day, with their individual participation only amounting to maybe one or two hours.

Outplanning the Other Side

Keep in mind that major negotiations are not only a mental but a physical task. If the cast of characters from both sides are assembled and are resolved to continue the meeting until negotiations are completed, you might be there for a week or two. In this case, the idea is to outplan the other side.

With planning, you can have an emotional advantage by requiring the vendor's people to be at the negotiations the entire time and have your members only strategically present when they are needed.

The next major step is to determine the requirements or define the problem or set of problems you want to resolve in your negotiations. You must go through a data collection process, set meaningful objectives, prioritize these objectives, parameterize them and then arrange an agreement between the negotiating team members that the objectives are what you wish to accomplish. You must then get appropriate levels of approval from the top management of your company so you have authority with which to negotiate.

Data collection is important because most computer negotiations are won or lost on the basis of the information the negotiating team has and the effectiveness with which it is used.

The first thing that should be done is a survey of members of the DP department, top management in your company and the ultimate end users of the DP department.

Too many times a contract decision maker, lawyer or financial type negotiating a computer contract without this survey leaves some considerations out of the contract because he has a predetermined set of ideas about the best method of acquiring a computer for the company.

Once you have a handle on your requirements, expand your survey to other computer users of your chosen vendor.

Look through your own vendor contract files if you have had any history at all in negotiating to determine how well you have done in the past.

Try to form some "extrapolated concession rationale" for the new equipment you are considering. That is to say, if X concession was given to you in the past for Y amount of computer value, then extrapolate X into the size of computer that you are currently considering.

You should make a very serious effort to collect substantiative data. For example, collect all of your past, currently in effect and currently considered contracts. Review your files for all side letters documenting "noncontractual commitments," statements on vendor policies, and areas of agreement and disagreement you have had in the past with computer vendors.

Another helpful thing is to develop a narrative chronological history of your company's past relationship with computer vendors.

Auer is president of International Computer Negotiations, Inc. in Winter Park, Fla.

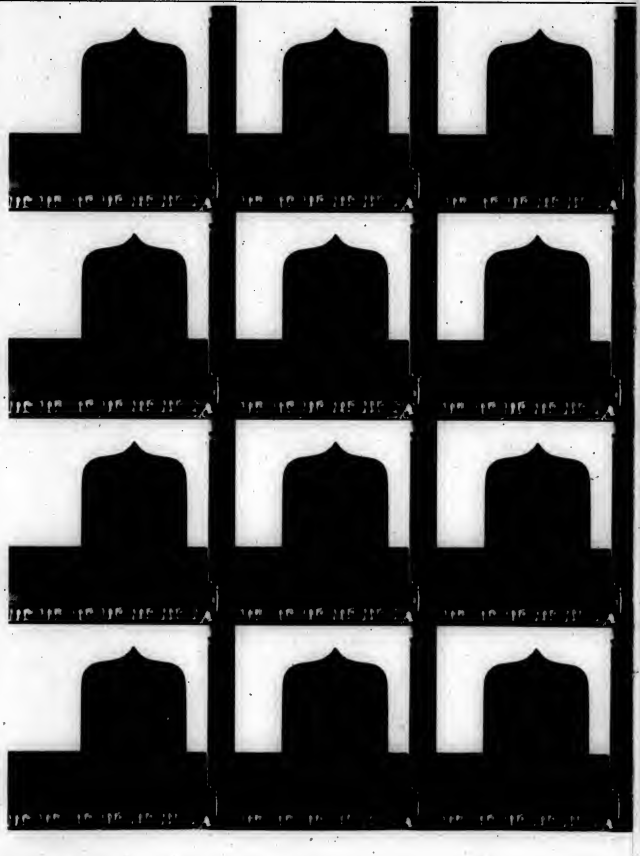
EMM Has Add-On for 370/168

HAWTHORNE, Calif. – The Multimemory/168 add-on storage system for IBM 370/168 systems was designed to increase the memory of a single processor by up to 8M bytes and the memory of a multiprocessor configuration by up to 16M bytes, according to its vendor, Electronic Memories & Magnetics Corp. (EMM).

The unit, which permits 168 users to upgrade existing systems, includes a deferred maintenance feature allowing an operator to detect memory failure on a lighted display panel and correct the failed memory block via a switch on the panel.

This removes the memory block from the system and restores address continuity, permitting maintenance to take place at the user's convenience, a spokesman explained.

The Multimemory/168 costs about $240,000 for 2M bytes of memory from EMM's System Equipment Division, 3216 W. El Segundo Blvd., Hawthorne, Calif. 90250.



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Inforex Software Enhances System 5000

BURLINGTON, Mass. – Inforex, Inc. has enhanced its System 5000 file management system with software that gives the user the ability to perform logical operations, validate data and reformat files and records, the company said.

Release 505 also features table lookup and multiple file access as well as 21 English language instructions that allow users to "custom tailor" their applications, Inforex said.

Available without charge to installed 5000s, Release 505 will be offered on all new System 5000 shipments at no increase in price, the firm said.

The software does not require any additional memory or occupy any more overhead than the previous release, a spokesman noted.

With Release 505, users can customize many file automation applications without depending on skilled programming and systems personnel, he added.

The features allow operators to write their own procedure controls as well as edit routines, he explained.

A typical System 5000, including four terminals, a terminal control unit with tape drive, two 30 char./sec printers and a 25M-byte disk drive, leases for about $2,300/mo on a 42-month contract. The price would be about $104,000, the company said.

Inforex is at 21 North Ave., Burlington, Mass. 01803.

Identicon Unveils Reader, Extends Capability of 600

FRANKLIN, Mass. – Identicon Corp. has introduced another optical bar code reader for use with its bar code reading systems and has enhanced its 600 series of optical pen scanning systems.

The Model 515 bar code reader is available in two versions, one reading at a distance of 1/4 in. from the face of the reader to the label and the other at 1/2 in., Identicon noted.

The unit uses an integration technique that allows the reader to ignore voids in the dark bars and spots in the white bars.

The 600 series has been enhanced to include the two- and five-character supplemental encodations to the Universal Product Code (UPC), Identicon said.

The Model 515 costs $400; the 600 systems cost $1,200 for one unit of the single-channel OEM version or between $520 and $1,125 per channel for a 16-channel multiplexed end-user version.

Identicon is at 1 Kenwood Circle, Franklin, Mass. 02038.

Mixed Shop Goes To Third Party

(Continued from Page 33)

In addition to improving service, Halveland was able to save money.

"Our contract with RSC cut our maintenance costs by 22%," he said. "The money we saved enabled us to buy additional software to take fuller advantage of our system capabilities."

The archdiocesan system is used for a variety of purposes, including financial and academic recordkeeping for the 12,000 students in 15 high schools in the district. It also helps prepare materials, pledge reminders and reporting results for an annual fund-raising drive involving 145,000 persons in the area.

Another application on the system involves the handling of mailing and billing lists for the *St. Louis Review*, a weekly archdiocesan newspaper mailed to 85,000 readers.

According to Halveland, the 12 people at the center work on a shift and a half. All the applications programming was done at the DP department except for certain packaged utility programs.

Among the more interesting applications on the 360 is a system that keeps track of the religious orders in the archdiocese, Halveland said. It provides a personnel profile of the nuns and priests that includes where they went to school and their academic achievements, past ministries and special abilities.

This enables the district to "go into the system and find out who is qualified to teach calculus or work with Spanish-speaking people," Halveland said.

In another application, the system is used to perform time- and cost-accounting work for social workers who are employed by Catholic charities.

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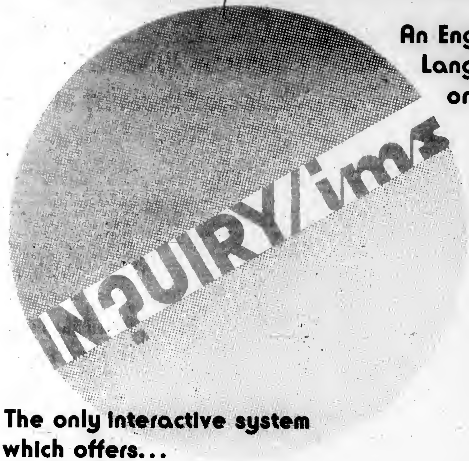

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Replaces Teletypewriters

System Processes $6 Billion/Day in Money Transfers

By a CW Staff Writer

CHICAGO – The First National Bank of Chicago (FNBC) is processing some $6 billion a day in money transfers using a minicomputer system, according to a bank spokesman.

FNBC has interfaced the minicomputer system with the Federal Reserve Bank Transfer Network (Fedwire), which is responsible for transferring funds between banks.

The bank's previous teletypewriter communications used to transfer funds was considerably slower and subject to error, according to Daniel Dinges, operations officer at FNBC.

With the minicomputer, "we have increased the daily number of output items from 500 to 1,100 with no increase in staff," Dinges noted. "The current error rate is extremely low and, we believe, very competitive."

The decision to purchase a minicomputer was made by a committee with representatives from the DP staff and the various affected operating units which drew up a decision table reflecting a consensus of their criteria, Dinges said.

The table was weighted very heavily toward least cost/best performance concerns, he added; when the various systems were considered, those that had a minicomputer architecture received higher scores.

A Varian V-74 was chosen after a technical support staff of hardware analysts compared it to some others, he said.

Individual transfers on the automated system at FNBC are often in excess of $50 million.

Sears, Roebuck & Co., for example, may call FNBC and ask the bank to transfer funds from its account to another company's account at Chase Manhattan Bank in New York. After FNBC verifies that the request was made by an authorized person and that sufficient funds are in the Sears account, transfer instructions are given to an FNBC operator at a CRT terminal linked to the mini.

The operator then enters the fund transfer into the system. The mini expands the message via file searches and formatting programs to create a message for Fedwire.

Most banks compose Fedwire messages by manually searching documents, but the mini retrieves such information as the number, status, title and address of the account, the American Banking Association number and the Fedwire abbreviation for the bank receiving the funds from its disk files.

After the standard Fedwire message for the Sears transfer is formatted, it is sent to the Federal Reserve Bank in Chicago, which takes the money from the FNBC account and sends a message to the Federal Reserve switching center in Virginia.

The Virginia center then routes the message to the New York Federal Reserve Bank, which credits the appropriate Chase Manhattan account.

Incoming transfers to FNBC are received by the system without human assistance.

When the Federal Reserve system falls behind in its data processing, the minicomputer queues the messages and empties the queue at the first opportunity. This feature becomes particularly important as the Federal Reserve's 2 p.m. (Chicago time) deadline for the same-day money transfers to the East approaches.

After 2 p.m., FNBC may be subject to a one-day interest liability fee on transfer funds it still holds.

The FNBC system has 96K words of memory, two disks, two tape drives, two high-speed printers and two paper punches.

The system also enables the bank to more effectively oversee its reserve funds. FNBC is required to maintain reserve funds equal to a composite percentage of its various types of deposits, which the Federal Reserve checks weekly.

Software Development Called Micro Users Bane

By Toni Wiseman
Of the CW Staff

LOS ANGELES – "With the very attractive and ever-decreasing microcomputer hardware prices acting as a magnet to potential users, software development looms as an ever-increasing proportion of a user's overall investment in a given application," Duane Dickhut told the recent Western Electronic Show and Convention (Wescon) here.

Dickhut, from Digital Equipment Corp., noted software development tools have become a key factor in the overall success of a user's project. Selecting the proper tools is becoming a more important decision, he said.

Microcomputer software tools, in order to match the attractive hardware prices, should retain the minicomputer's properties of flexibility and ease of use, but offer better price performance and packaging, he proposed.

"One of the best ways to evaluate development tools is to actually get hands-on experience," he stated, adding the user should explore whether both Assembly and high-level languages are offered; whether the assembler has a macro facility; and whether the operating system comes "ready to run" rather than being generated.

Users should also check to determine if other utilities, such as interactive batch capability, are included.

"A potential user who has an application that he perceives may be solved by either a low-end minicomputer or a microcomputer (or microprocessor on a board) wants to certainly evaluate the available software development tools as a key component of his decision-making process on whether to use a mini or a micro," he said.

A potential user doesn't want to fall into the trap of being enticed by low hardware prices and merely assuming the software development will be as expensive, he cautioned.

It is relatively easy for the potential user to evaluate, by many means and through various sources, minicomputer software development tools, Dickhut said.

"He will probably conclude that those tools offer flexibility, ease of use and field-proven maturity in a reasonable price/performance package.

"With microcomputer software development tools, however, the evaluation process is not that easy, primarily because of the industry's infancy," he said.

The First Step

The first step is therefore to perform an inventory of what comes in a package when it is bought and whether it consists of a true operating system or stand-alone programs, Dickhut said.

An operating system manages the system's resources efficiently and effectively so a programmer can be more productive and focus on the immediate task at hand, he said; with a stand-alone program, however, he has to worry about managing the system's resources.

"A major aspect to determine from the kit is what languages come with it and, more importantly, what languages are optionally available that will run under the operating system.

"The amount of language support is crucial to flexibility for the user in that he has the freedom to either implement his application in Assembly language or a high-level language such as Fortran or Basic," he said.

The user's schedule, available development dollars and software transportability will be the driving function in selecting an implementation language, he explained.

Another consideration is the macro assembler, he said. While it may not be deemed essential at first, a good macro facility can allow a user to assemble other microprocessor instruction sets by simply writing a set of macros, creating a source file in the target machine's language and passing that source file along with the macro definitions through the macro assembler on the development system, he observed.

This means the user can take advantage of this flexibility by not having to purchase a software development package for every microcomputer he buys, he noted.

Finally, the package should be examined for other utilities such as a debugger, a file manager and an editor that creates and modifies other source packages.

NCR Hikes Century 151 Memory, Cites Trend to On-Line Systems

DAYTON, Ohio – NCR Corp. has increased the amount of memory available on the Century 151 system in response to trends toward multiprocessing and online/real-time systems, the firm said.

Formerly available with a maximum of 128K of memory, the Century 151 can now accommodate up to 256K. Users can upgrade their systems in the field up to 128K for a charge of $10,000 for each additional 32K of memory; further upgrades cost $10,000 for each 64K thereafter, not including the installation charge, NCR said.

The memory uses 64K-byte boards with 4K MOS random-access memory (RAM) chips. The memory can be contained in the existing processor and auxiliary cabinet, the firm noted.

The expanded memory was designed to allow users to implement larger multiprogramming systems and use Resident Sector Management (RSM) software with virtual memory techniques.

A basic Century 151 with 192K of memory, card reader, line printer, 9.8M bytes of disk, thermal printer, four I/O trunks and auxiliary cabinet costs $149,925 or $3,675/mo on a five-year lease.

The system with 256K costs $159,925 and rents for $3,975/mo on the five-year plan, NCR said from Dayton, Ohio 45479.

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PRIME

System 'Almost Limitless'

Mini Soothes Company's Growing Pains

By Esther Surden
Of the CW Staff

MELVILLE, N.Y. – An electronic components manufacturer here has found its minicomputer system has given it the necessary flexibility to deal with its growing pains.

International Components markets and distributes electronic components for OEM and replacement areas. Products include resistors, capacitors and semiconductors as well as electron tubes, according to Elihu Zucker, vice-president and controller of the firm.

The company was prompted to purchase a minicomputer when its growth outstripped the capabilities of its former systems. "We had two Burroughs 6000 magnetic card systems and still couldn't keep up with the work. It was taking us seven or eight days to prepare month-end reports," Zucker recalled.

Because of previous good experience with Burroughs systems, the company decided on a B1712 with a 64K memory, two dual-disk drives, two 96-column off-line keypunches and one on-line keypunch. The system cost the firm $115,000 when purchased.

Formerly, the two 6000 systems worked 24 hour/day, Zucker noted. Now the DP department is on an eight-hour shift with a DP manager who is also a programmer; a computer operator; and two keypunch and edit personnel.

Applications on the system include inventory control, sales analysis, accounts payable, check writing, payroll and billing.

In the future, the company plans to put disk packs on the system because of an increasing number of transactions and the amount of record information being developed. The packs will allow the firm to expand its on-line memory capacity.

The firm also expects to put CRTs in the inventory and credit departments. Inventory control is presently taken care of via a weekly report, but the firm would like the accuracy of having the system on-line. The CRT in the credit department could perform credit checks.

The system, Zucker added, "is as good as your imagination." International Components started with canned application programs which are now taking on the firm's own personality, he explained.

The system's ability to perform is "almost limitless," he added, and its flexibility has been a great help to the company.

Mini Bits

Government, Business Use Topic of AIIE Conference

WASHINGTON, D.C. – A conference on minicomputer applications in government, business and other organizations will be sponsored by the American Institute of Industrial Engineers (AIIE) here Dec. 6-8.

The conference costs $265 for AIIE members and $295 for nonmembers. Information is available from AIEE at P.O. Box 3727, Santa Monica, Calif. 90403.

Exchange Set Up for SR-52 Users

DALLAS – Texas Instruments, Inc. (TI) has set up an exchange center here for current and potential SR-52 programmable calculator owners.

The Professional Program Exchange makes specialized programs in professional categories contributed by other professionals available to the users.

A $15 annual membership fee entitles users to a catalog that lists available programs and updates, a newsletter and three free programs of their choice. Additional programs cost $3 each, TI said.

The exchange can be reached through PPX-52, P.O. Box 22283, Dallas, Texas 75222.

Hands-On Micro Meeting Scheduled

AMES, Iowa – A conference on microprocessors and microcomputers with a hands-on, laboratory-oriented approach is scheduled at Iowa State University Nov. 15-19.

Topics will include operation codes, introduction to the peripheral interface adapter (PIA), microcomputer systems applications using the PIA and some systems design examples using microcomputers.

The registration fee is $295. More information may be obtained from Roger Camp, 332 Hoover Hall, Iowa State University, Ames, Iowa 50011.

E&L Plans Micro Training Seminar

SPRINGFIELD, N.J. – E&L Instruments, Inc. will present a two-day training seminar on microcomputers in Kennilworth, N.J. On Oct. 9-10.

No previous experience in digital electronics or microcomputers is necessary, the firm said, and enrollment will be limited to 30 people.

Cost per student is $80 from Shortess-Rawson and Associates, 155 U.S. Route 22, Springfield, N.J. 07081.

System Industries Cuts Disk Price

SUNNYVALE, Calif. – System Industries has reduced the price of its 3500 cartridge disk subsystem by about 20%, the firm said.

The 2.5M-byte moving-head unit formerly cost $8,800. It now costs $7,200, making the unit useful as an alternative to floppy disks, a spokesman claimed.

The system, which is based on the Diablo 30 series drive, was designed for the user whose data requirements will grow to 300M bytes. The price reduction is the result of "economies in manufacturing," the firm said.

System Industries is at 535 Del Rey Ave., Sunnyvale, Calif. 94086.

Sola Adds Voltage Regulators

CHICAGO – A line of voltage regulators from Sola Electric designed for use with minicomputers is said to offer complete isolation from the power line.

The portable units feature quiet operation and are simple to install, the vendor said.

Prices for the units start at $340. Sola is at 1717 Busse Road, Elk Grove Village, Ill. 60007.

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Winery System Brews Annual Savings of $10,000

By Bertram Silk
Special to Computerworld

CANANDAIGUA, N.Y. – Blending calculations at Canandaigua Wine Co. once took a winemaker three to four hours daily. Since we installed a small business system, these calculations take less than 30 minutes, and we are saving $10,000/year.

We had many applications in mind when we decided to search for a small computer – blend calculations, inventory pricing, government records, tank records and some personnel records. We justified the purchase of the Wang Laboratories, Inc. 2200 using the first two – blend calculations and inventory pricing.

Pricing the inventory formerly took three to four man-days each month. The system has reduced that to about four hours a month.

The time saving in just these two applications represents a dollar saving for us of approximately $10,000 per year – enough to repay our investment in the unit.

Further, the system is accurate in its calculations and we have printed information to give to our winery crew.

Personnel Listing

After bringing up our inventory pricing and blend calculations applications with software developed by a local vendor, Dynamic Programming, Inc. of Rochester, we added a personnel list with employee names, addresses and phone numbers.

Our personnel manager keeps the list up to date, and one benefit of maintaining the list on our own system is the ability to generate our own mailing labels for our employee publications.

Before we purchased the Wang computer, we had installed an IBM 3 to handle most of our front office DP. It would have been possible to implement inventory pricing and blend calculation on that system by adding more terminals, but we reasoned that the Wang 2200, which uses Basic as its software language, would prove easier to program.

Although we experienced some difficulties with software in the early stages of our system development, those problems were solved and we are convinced that, in terms of programming, we made the right dccision.

Canandaigua's configuration consists of a 2200 desktop system with self-contained CRT, keyboard and cassette tape drive; a diskette for data storage; and a 200 char./sec printer.

Preparing Work Sheets

Our winery planner uses the system each morning while preparing the day's work sheets. The planner begins by loading the system's diskette unit.

The planner first enters the number of the tank with which he wants to work. Given that tank number, the computer displays the current volume of that tank in gallons, the current liquid level in inches and the total capacity of that tank.

The winery planner can then enter the amount to be added to or subtracted from that tank with a simple keyboard command.

After the planner hits the EXECUTE key, the 2200 displays the new volume, level in inches and total capacity of tank number three.

The updating of the disk is done by a clerk at the end of each day, after the completed work sheets have been returned.

Using the same diskette the winery planner used that morning, the clerk calls for tha "set up daily tape" software routine with a keyboard command. Operating again in question-and-answer format, the computer asks the clerk to enter the first work order number.

Next, the operator responds to a request for the number of the tank from which material was transferred in accordance with that work order number. In response to that number, the computer displays that tank's final observed level in inches.

The computer then asks the number of the tank to which material from tha first tank was moved and displays the final observed level in that tank.

At tha end of each month, Alan Sterling, our supervisor of government records, loads the "wine" diskette, calls up a "list inventory" routine and presses the EXECUTE key.

The unit responds with a printout categorizing the contents of every tank in the winery both in terms of lot number and classification of tank contents, i.e., tanks holding material, fermenting wine, wine less than 14% alcohol, wine 14% to 20% alcohol, wine 21% to 23% alcohol or empty tanks.

Our winemaker uses the computer for approximately two hours in the morning and in the afternoon to calculate as many as seven blends in a single session. The winemaker learns each day from the winery planner the quantities of each blend needed. The winemaker knows the specifications, the materials and the approximate quantity of each material needed to produce each blend; the computer helps him refine those approximations.

The winemaker also knows the key characteristics of each required material – its color, brix, degree of alcohol, acidity and potassium and sulfur dioxide content.

After the winemaker's diskette is loaded into the 2200, the unit, again with question and answer routines, asks how many variables are unknown, that is, what quantities of how many materials the computer must calculate.

Typically, the winemaker will respond by keying in the number "1," having been able to specify the quantities of other materials needed in that wine.

Then, for each material in sequence, the winemaker keys in the number of the tank in which that material is contained, the lot number and the results of tests on that lot: percent of alcohol, degree of brix, color reading, acidity level and parts per million of potassium and sulfur dioxide.

He then enters the percentage of each material or a question mark if that material is to be the unknown variable.

The printout produced after all of those entries have been made for each material lists the quantities in gallons of each material needed to produce the necessary quantity of that particular blend. In its blend calculation application, the computer acts as a check on the winemaker's preliminary calculations.

Silk is vice-president of winery operations at Canandaigua Wine Co.

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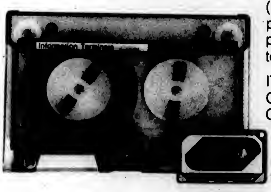

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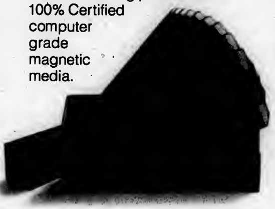

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System Brings $40,000 Savings

College Makes Use of Mini Stashed in Basement

By Esther Surden
Of the CW Staff

SAN FRANCISCO – Although a "Do Not Disturb" sign doesn't really hang on the minicomputer at Golden Gate College here, the system is hidden away in the basement to keep it in the same condition it has been in since it was purchased in 1973, according to Dr. John Lehane, chairman of the Information Science Department.

The 24-bit Basic Timesharing, Inc. (BTI) minicomputer with 10M bytes of disk is accessed from user terminal sites within the building and by a portable terminal, Lehane said. The mini is a stand-alone unit and requires no operator, he added.

Before purchasing the system, the school had been using commercial time-sharing services, Lehane continued, with the monthly bill coming to about $3,000.

The system cost about $56,000 when purchased and has been upgraded with additional disk for about $10,000 more. The savings since the time the school installed the system amount to over $40,000, he said.

Maintenance Factor

The school consulted various mini manufacturers before choosing the BTI system. The minis considered included the Hewlett-Packard (HP) 21F, the HP 3000 and Data General Corp., Microdata and Varian systems. The BTI system was chosen on the basis of its price/performance ratio, Lehane said.

Another attractive feature of the system was its maintenance, he added. The BTI system can be serviced remotely from the vendor's home office, eliminating the need for a costly maintenance contract.

"The other vendors were talking about a $300/mo maintenance contract on the systems," Lehane said, "and that amounted to a great deal of money over several years."

The system has been down only once since the school installed it, he continued, and that was because of a power supply failure. Occasional system stoppages are often taken care of by just restarting the CPU.

The college, which teaches business and public administration as well as law, uses the system for various academic subjects such as financial analysis and statistical analysis as well as some administrative functions.

Basic is the only language taught on the system, and courses that require Cobol must use an outside service. About 2,000 students taking 30 courses use the system.

The mini has eight time-sharing ports directly connected to five teletypewriter terminals and two Execuport 1200s from Computer Transceiver Systems, Inc. One portable terminal is used outside of the building and is connected over phone lines.

The CPU runs 24 hours a day, seven days a week, Lehane said, allowing students to access it at almost any time. The only time the system must be scheduled for use is toward the end of the marking period, when projects have to be completed, he noted.

The school is instituting an information retrieval system on the mini, Lehane said, to tell if a book is located in the college's various libraries.

The plant manager also keeps an inventory of the physical goods on campus with the system, he added.

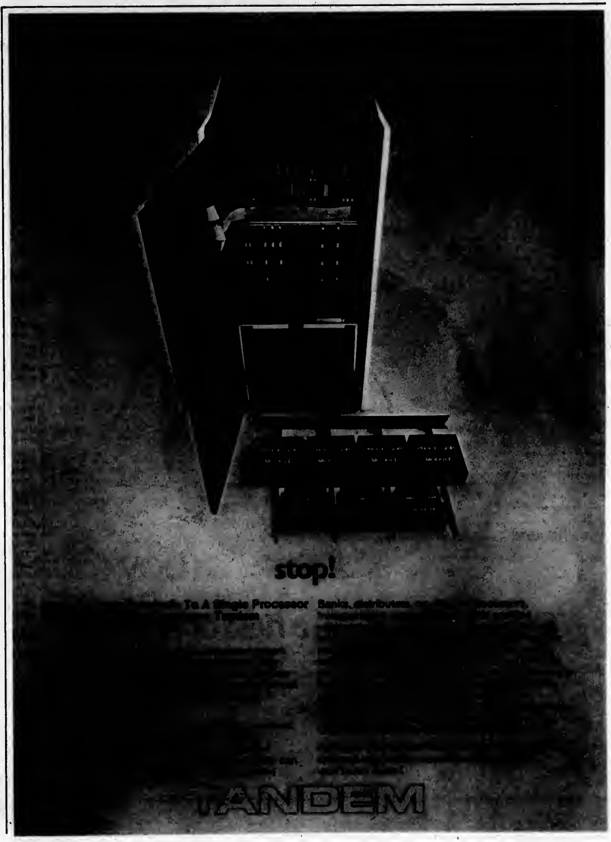
NCR Has Turnkey For Restaurants

DAYTON, Ohio – A minicomputer-based sales analysis, inventory and cost-evaluation system for small to medium-sized restaurants is available from NCR Corp.

Three application modules are used by the NCR 499-based system when it is employed in front-end or input operations, NCR said. They process data from electronic cash register memory, data recorded on cassettes by the registers and data from either an NCR 7200 data capture terminal or entered through the NCR 499.

A fourth module processes sales and inventory transaction data generated by the other three modules, the firm said. The system creates and maintains three master files for processing, including the menu master file, the consolidated menu master file and the inventory master file.

A basic system with 20K of memory, a continuous forms feeder and three cassettes cost $24,800. The modules cost $750, $600, $700 and $1,750 respectively and will be available in the fourth quarter, NCR said from Dayton, Ohio 45479.



System Helps Aluminium Plant Assess Metal's Purity

FERNDALE, Wash. – A minicomputer here is helping one of the nation's largest aluminum reduction plants produce blends of metal for its customers, the user said.

Intalco Aluminum Corp. annually produces 265,000 tons of aluminum – one ton every two minutes around the clock – and now uses an IBM System 7 for continuous spectrometric analysis in production.

"The system examines the purity of each sample of metal produced during 21 shifts per week from our 720 electrolytic cells which are in constant use," according to Roy G. Cunningham, Intalco's DP superintendent.

"In addition to pot sample analyses, we perform casting sample analysis and ladle analysis. This program contributes significantly to optimizing the use of different metal purities into compatible alloys being produced," he added.

Samples are taken from each pot with a vacuum dipper every four shifts. The samples are then lathed to a single smooth surface. This surface is exposed in the spectrometer and, by measuring the iron and silicon present, Intalco learns how each cell is performing.

Results are accumulated by pot for a continuous record and an indication as to when scheduled pot maintenance should occur.

Ladle analysis is performed daily to produce a suggested tapping sequence for the following days.

In addition, Intalco workers sample furnaces in the cast house for blending results and for metal certification. When ingots are sent to the extrusion plant or rolling mill, each must meet a specific chemistry and physical profile and must carry a company certification.

Continuous sampling prior to cast house blending and during pouring from the furnaces produces samples for certification.

During each sampling cycle, the system receives voltage data from the mass spectrometer indicating the presence and parts per million of 21 elements. The metallic standards are continuously calibrated for accuracy via the computer.

Each result is tallied on a single computer-printed sample report, checked against customer specifications and stored electronically by the computer for future reference.

Linked by telecommunications lines with Intalco's central IBM 370/125, the System 7 also relays data collected from on-line process computers for production reporting and planning purposes.

"We are using computers here," Cunningham said, "to make our plant operate as productively and smoothly as possible, producing the highest quality aluminum as quickly and as economically as possible.

NCR Turnkey Handles Accounting For Small Physician Practices

DAYTON, Ohio – A system designed to meet the accounting needs of the small physician practice has been announced by NCR Corp.

The turnkey system is based on the NCR 299 and includes two basic applications, patient billing and accounts receivable.

The patient-billing program prepares a statement with five credit descriptions and up to 70 service descriptions, the company said.

The billing program can also generate self-addressed return envelopes to reduce the turnaround time on bills, a spokesman noted.

The accounts-receivable program posts all payments, balances any refund that has to be made and provides an aging analysis of the receivables, he added.

The system includes an NCR 299 processor with magnetic ledger handler and costs $12,500. NCR is in Dayton, Ohio 45479.

Datum Has Transport For HP 9830 Users

ANAHEIM, Calif. – A cassette transport configuration provides Hewlett-Packard (HP) programmable calculator users with 300,000-character storage at 30 in./sec read/write speed, according to its vendor, Datum, Inc.

The system was designed to complement the calculator's internal memory with additional mass storage for programs or data, the firm said.

The recorder interfaces with the calculator through HP's data communications interface cards and with other devices through its three internal channels, Datum said.

Available in two configurations, the single-transport, desktop unit is 8 in. by 12 in. by 16 in.

The dual-transport, rackmounted unit is 8.75 in. by 19 in. by 18 in. Weight is 40 pounds; power required is 100W at 115V, 60 Hz.

The Model 4000 single-transport unit costs $2,825; the dual unit costs $3,725 from Datum's Timing Division at 1363 S. State College Blvd., Anaheim, Calif. 92806.

Spear Enhances Clacs With Analyzer Interface

WALTHAM, Mass. – B-D Spear Medical Systems has enhanced its minicomputer Clinical Laboratory Automated Computer System (Clacs) to allow it to be interfaced to a wide number of chemical analyzers as well as other hospital computer systems, the firm said.

An editability program has also been added to the system which permits users to handle day-to-day changes in test procedure parameters at a CRT.

Based on the firm's own minicomputer, a basic configuration includes a CPU with 16K of memory, two 200 line/min printers, two CRTs, software and training.

The system costs about $99,500, the spokesman said from 123 Second Ave., Waltham, Mass. 02154.

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CI Notes

Inforex Buys Beehive CRTs for New Product

BURLINGTON, Mass. – Inforex, Inc. intends to enter the intelligent terminal market and has signed a two-year contract valued at about $7 million for terminals from Beehive Medical Electronics, Inc.

Under the agreement, if Beehive cannot supply a version of its B800 and B100 in needed quantities, Inforex may obtain manufacturing rights.

Inforex is developing software and is planning future product announcements within six months, a spokesman said.

DEC Sights Vermont Site

MAYNARD, Mass. – Digital Equipment Corp. is heading for the hills of Vermont in its latest round of space acquisition.

The firm has agreed to acquire 180 acres in South Burlington for the future site of a manufacturing plant and has signed a lease for 32,000 sq-ft in a Sperry Rand building in nearby Colchester.

At Colchester, it expects to build an additional 28,500 sq-ft plant by mid-1977, a spokesman said. Colchester will be used as a pilot manufacturing operation, he said.

He was, however, unable to specify what product line will be manufactured in Vermont.

BST Gets Lease Financing

SANTA ANA, Calif. – Business Systems Technology, Inc. (BST) plans to provide lease financing through its new limited partnership with Girard Leasing Corp., to be known as GBS Leasing Associates, Ltd.

Under the partnership, several million dollars of financing will be available yearly, according to Dion Cairns, BST's vice-president of finance.

Views on Leasing - Part 1

IBM Saw NS Hurting Leasing Industry

By Molly Upton
Of the CW Staff

NEW YORK – "For the first time, the [computer leasing] industry will face head-on competition from its previous benefactor – an aggressive IBM sales force."

This quotation is from an IBM market evaluation study written in 1968 which detailed how the introduction of New Series (NS) equipment, later known as the 370 line, would force the leasing industry into a profit squeeze, if not negative results.

The report, Plaintiff's Exhibit 3455, and other market evaluation studies have been entered as evidence by the Justice Department in its antitrust case against IBM.

IBM seemed to view the NS as an attack, or counterattack, on the "glamour industry" which had eaten into its lease base, the study indicated.

IBM Trial Documents

Calling obsolescence the "Achilles heel of the leasing industry," IBM strategists revealed how the NS would affect lessors.

The new systems, expected to be available by 1972, would force the leasing industry to increase its discounts to the 40% to 50% level, moving the break-even point out to 1978 and beyond. This would occur when the average age of lessors' inventory had not reached the midpoint of its 10-year life, the report indicated.

IBM expected the leasing industry, which it said viewed the world through "rose-tinted glasses," to continue to buy 360s without forethought of obsolescence.

"As the specter of 40% and 50% discounts become a reality, the shining light on the leasing industry will begin to fade.

"It will become abundantly clear that any return on 360 investment is by no means a certainty – because the effects of the fourth generation will cause the industry's 1970 record earnings to turn abruptly downward.

"Even massive investments in NS, and its competitors, will not produce enough 'book' profit to prevent industry earnings from coming periously close to *no profit* in 1973," the report said.

"We expect the leasing industry's 360 revenue and profit growth to terminate in 1970. Beginning in 1971, as the effects of fourth-generation equipment take hold, revenue from 360 will begin to decline – but profit will *drop* as costs, i.e., depreciation, maintenance, interest, etc. refuse to disappear."

The leasing industry, the report explained, "has placed its 'bet' on one basic element – life."

(Continued on Page 44)

Software, Semis

DP Growth Rate – Sharp or Sloping?

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – The growth rate of the computer industry was debated by speakers at the recent IEEE Computer Society's Compcon '76 meeting here.

Although it was generally conceded developments in the industry fit an "S"-shaped learning curve, the disputes centered over whether the industry faces the slow, steady growth of the upper and level part of the "S" curve or whether its developments and breakthroughs will continue to occur at the exponential rates portrayed in the steepest part of the graph.

Looking at the software and particularly at the learning curve for programmers, Elaine Bond, manager of programming for IBM's System Products Division, stated she sees a mature, managed and steady growth rate which will have its effect on the industry as a whole.

But looking at the likely innovations in computer architecture over the next five years, Richard J. Clayton, vice-president for computer systems development at Digital Equipment Corp. said the industry has just begun in terms of the systems it will install and the people it will involve in computer use.

For Bond, the steady leveling off of growth comes with the need to treat software and its production more as a business and less as the art it has been considered in the past. She focused on managing the creation of software, and on the technology of software design.

Bond urged her audience to involve programmers in the business of turning out programs, noting "programming is still labor intensive; there is no substitute for skilled people."

IBM now spends more money earlier in software development than it used to in hopes of shipping fewer errors along with its final product, she said.

By designing tightly managed systems for programming like that used in her company, Bond suggested a 50% to 100% improvement in programmer productivity is possible.

Fundamental Forces

While Bond emphasized a refinement of skills, techniques and technology already available, Clayton maintained the nature and shape of the computer industry over the next five years will be determined instead by technological forces that are "fundamental, fast and formidable."

Clayton noted the basic physics of the industry are in place. He agreed with Bond that recent investments in software technology have improved the ability to write software, adding those investments are "impressive, large and rapidly growing."

Technical drives and particularly those that are semiconductor-oriented, however, will be primarily responsible for industry growth, he asserted. These drives, in turn, will create a matching marketing drive leading to "exponential growth in the number of installed systems – programmable and somewhat general purpose, Clayton said.

Memory bit densities will increase at nearly 89% per year for the next five years, he predicted. Disk storage will increase 41% per inch of surface each year for the next five as well.

Charge-coupled devices and bubble memories are on their way and are important as intermediate storage devices in terms of cost and access time, Clayton stated.

In what he called the "computation area," the means for collecting "logical elements" on circuits are coming together at speeds of about 60% per year, the DEC vice-president noted.

Reasonable ways of obtaining economies of scale in such semitechnical areas as processing, protocols (particularly in communications systems) and cache memories are also "in the bag in the labs today," Clayton stated.

"This is the nature of the

(Continued on Page 45)

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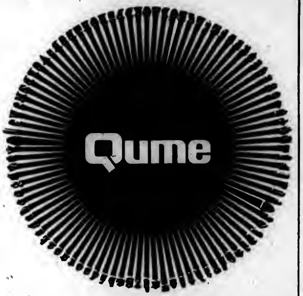

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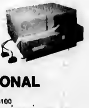

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DPF Moves to Combat IBM Strategy By Offering 370/138, 148 for Lease

By Molly Upton
Of the CW Staff

HARTSDALE, N.Y. — "The best defense is a good offense," DPF, Inc.'s vice-president of marketing said recently in explaining the firm's campaign to offer 370/138s and 370/148s on operating leases.

Although he admitted the smaller purchase-lease ratio offered by IBM on its new machines is "terrible news" to lessors because it gives them a smaller umbrella under which to operate, "we're opportunists," Tony Pintauro said.

By offering flexibility and taking greater risks on its equipment, DPF intends to capitalize on the latest IBM move, he said. "The only way you can compete against IBM is to take more risk," he added.

In explaining DPF's strategy, he said that when IBM announces something like the 138 and 148, the world stops doing business with leasing companies for a while.

"We had a number of objectives: letting the world we deal with know that we're still in business, that we're willing to go with 135s, 145s, 138s or 148s and that we're willing to look at their problems. This is in order to maintain our customer base," he said.

In addition, "there are a number of people who may not have the full story on the 138 and 148, so we'll present a 135 or 145 as an opener for sales.

"We've had IBM's complete line for the past 10 years, which IBM isn't offering. I may own 135s which I'm buying at 65% of original cost that perhaps meet the cost performance of the 138. We'll have to take a look at the numbers," he observed.

"A customer may have a 135. In going to a 138, he's going to have a bit of a problem because he'll lose his rental accruals. So we'll purchase it and lease it back, let him use his rental accrual, pass some of it through to him and give him an upgrade to a 138 or 148."

Another potential customer would be the user who wants flexibility in the future, he said. For instance, the user might want a 360/65 for a couple of years and then an upgrade to a 148.

DPF is in the business to "offer an alternative to the guy who wants to deal with IBM," Pintauro said.

"In the past, we've found out empirically that when IBM has a small purchase price to lease ratio, as it does with the 138 and 148, for some reason the customers hesitate because they envision another announcement.

"If they see a purchase-to-lease ratio of 52, they'll say IBM's going to be in this for a while because it's waiting longer to get its money back. But when the users see a purchase-to-lease ratio of 39 they'll say, 'Aha, somewhere along the line there's going to be another announcement,' " Pintauro said.

What DPF is trying to do is to demonstrate some kind of continuity to the user, he added. The offer is drawing a lot of response, he said.

"At 90% of IBM's best four-year term plan, a guy can save himself 10%, he has the machine he wants and we have just a little greater risk than we like to take, but in order to stay in business we may have to take it," he said.

IBM Saw NS Hurting Leasing Industry

(Continued from Page 43)

Later, it remarked, "With System 360, leasing companies have offered users a 'deal' that could not easily be resisted. The deal included the same products and services and almost the same flexibility offered by the manufacturers — all at a lower cost. The only problem for leasing companies is — life.

"The survival of third-party computer leasing as an industry depends upon the extent to which individual companies can 'weather the storm' of the early 1970s," according to the report.

For those firms that would survive, IBM foresaw a different role in a few years: "In the mid-1970s, we believe that observers will, in retrospect, look at early computing leasing activities as the means by which companies gained and supported footholds in the DP services field.

"In essence, third-party computer leasing may well by then have taken a supporting role to ventures such as software development, consulting, information marketing and even peripheral equipment manufacturing," the report said.

Concerning the current lessor attitude about continued status quo, the IBM report said, "Although leasing executives talk of the potential problems of obsolescence, we see no real selectivity of purchases or evidence of a slowdown — but the *reality* of a 'fourth generation' will cause an agonizing reappraisal."

The pressure for lessors to initiate large discounts will come from several sources, both IBM and other lessors, the report indicated.

The NS would offer 360 users "equal or more performance at lower cost." The IBM sales force would be making proposals for these systems since sales liability for 360s would have ceased; an additional incentive to discount 360s would be that other lessors would be offering the new equipment, IBM said.

The report spelled out how aggressive its sales force would be: "NS production schedules will generally not deter early displacement of leasing company 360s as the IBM salesman will give priority — first attention — to these gross equal net situations, and leasing companies, usually owning only 75% of the users' systems, have a limited base over which full system discounts can be spread."

The report also detailed how and why lessor-owned machines would be primary targets of the sales force.

"Upon announcement, *first* sales calls will be made to those accounts where leasing company machines were purchased prior to 1968 — these carry only a two-year liability.

"If we assume a 12- to 18-month delivery schedule in the first half of 1971, an IBM salesman could propose against a leasing company machine that was purchased in *June of 1968* — purchases subsequent to Jan. 1, 1968, carry a four-year liability."

Of significance was IBM's commission scheme for 370s. The salesmen would be highly motivated, for they would make full gross commission regardless of whether they sold an upgrade or a downgrade, a 1969 study observed.

The 1968 study indicated firms might avoid a shaking out if they "become correctly selective in their third-generation purchase programs, ultimately terminating these programs and switching to NS; counter some of NS' advantages through such things as customized software; utilize 360 equipment in DP-related activities, such as computer networks; and find areas of diversification that will dampen 360's effect on their [profit and loss statements]."

The report summary suggested "IBM management should consider third-party leasing as an industry in which *reported* profits will continue to grow until the early '70s — when liberal accounting and an obsolescent inventory will force an agonizing reappraisal. It is conceivable that third-party leasing will take a secondary and supporting role to evolving DP and service activities."

CDC, Iran Form Terminal Maker

MINNEAPOLIS — Control Data Corp. has taken a 30% interest in its latest joint venture firm, Computer Terminals of Iran (CTI), formed in conjunction with Iran Electronics Industries.

The total capital investment in CTI is about $25 million.

CTI was established to design, develop and manufacture advanced computer display terminals. Initial production of terminals, incorporating plasma display technology, is expected to begin in 1978, according to CDC.

Following initial development, which is currently under way at CDC's Roseville, Minn., facility, production will be established in Shiraz, Iran.

An Iranian development team will participate in the Roseville efforts and relocate to Iran, where it will continue R&D and technical support of manufacturing.

CDC's representative on the three-man CTI board is E.E. Strickland, a vice-president and senior staff officer.

In Next Five Years

Univac Sees Annual Net Growing 15%

BLUE BELL, Pa. – Univac officials indicated future product plans as they told analysts here recently tha firm expects an average annual growth in profits of 15% in the computer business over the next five years.

The company's ability to more than double computer revenue, profits, assets and installed base over the past five years, despite the effects of two recessions, has solidified Univac's second-place position in the industry, officials said.

"Our future growth goals are both realistic and achievable," Gerald G. Probst, Univac president, said.

During fiscal 1976, Univac revenues from computers accounted for 44% of Sperry Rand Corp.'s total revenues.

In fiscal 1977, the company expects to meet its objectives of computer revenue and profit gains exceeding 10% despite the significant impact of unfavorable foreign currency translation, according to J.J. Ciasullo, vice-president and controller.

Growth plans will be supported "by a continued high level of investment in marketing and research and development and by continued emphasis on computer finance leases over discretionary sales," the firm said.

The R&D budget for computers in fiscal 1977 is about $128 million. During the five years through fiscal 1976, it grew 120% to $470 million snd is expected to total about $900 million for the five years starting in fiscal 1978, the firm said.

Product Plans

R.C. Phillips, vice-president of development and manufacturing for the Systems Division, said Univac has made major progress in the past two years in establishing a large-scale integration (LSI) semiconductor facility to design and produce LSI parts for major systems.

In memories, bubble memory work has been stressed and the company expects to ship bubble storage in a small system product within a year.

The company is also working on an advanced development processor, a version of an 1100 series processor, involving custom-developed LSI circuits, he said.

Overall, multiple advsnced development processor afforts are under way to meet the needs of the lata 1970s and 1980s, the company said.

In looking at Univac product line development, Neil A. Gorchow, vice-president of product strategy and requirements, said current programs include product enhancements which will extend the upper and lower limits of the 1100 series, extend the lower limits of the 90 series and facilitate a move toward unification of the product lines in the 1980s.

The next five years will see significant developments in the areas of software, application programs, communications, data management systems and distributed processing, he said.

The flexibility of a modular processor unit, currently in its newest communications terminals, enables the company to economically span the range of small business systems and distributed processing networks, he added.

The firm is applying the same processor concept to the development of larger scale systems for the 1980s, he noted.

In analyzing Univac's commercial marketing thrust, H.A. Steinberg, executive vice-president of marketing and services, said the installed base for the company's general-purpose computer systems grew 55% worldwide from calendar year 1972 through 1975 compared with an industry growth of 43%.

In 1975, the base grew 17.2% over the previous year compared with 10.9% for the industry itself.

In looking at Univac's recent computer orders, Steinberg said 32% came from new customers. The established customer sales involved both expansion and new computer business with new computers amounting to 43% of the total order mix.

Despite foreign government protection of indigenous suppliers, Univac achieved compound annual growth rates of 23% for revenue and 20% for installed base since fiscal 1974 for the wholly owned operations of the company's Europe/Asia/Africa Division, he said.

Univac remains very interested in foreign joint ventures and would consider any reasonable situation, the firm said.

1968 IBM Study Saw Burroughs Emphasizing Terminals in 1970s

By Molly Upton
Of the CW Staff

NEW YORK – One of Burroughs Corp.'s principal competitive thrusts in the 1970s would be in terminal-based systems, an IBM market evaluation study predicted in 1967.

The report, entered into evidence in the U.S. vs. IBM antitrust trial recently, conceded respect for Burroughs' technical capabilities, observing that its DP products, which addressed almost all classes of the 360, "reflect technical excellence."

The Burroughs product line, it added, "appears to be the strongest prodnct competitor" to the IBM 360/30 and 360/40.

IBM felt Burroughs had devoted too littie attention to developing depth and breadth in its field organization, the study indicated. This factor prevented the firm from taking full sdvantage of its strengths, which IBM said were:

- "A more than satisfactory image.
- A product line which reflected a high degree of technical competence.
- Large representation in smaller businesses.
- A head start in multiprogrsmming systems.
- Communications/computer expertise developed via government defense contracts.

IBM Trial Documents

Burroughs' DP revenues in 1966 sccounted for 13% of its total revenues, and IBM saw this growing to 16% in 1971. It did not expect Burroughs' growth to exceed 20%/year.

IBM thought Burroughs' principal emphasis would be on the accounting machine market, especially the electronic portion, with efforts in the DP marketplsce playing a secondary role.

IBM begrudgingly had respect for Burroughs' nonremovable disk file which, on the one hand, it berated as functionally most comparable to drums but, on the other, admitted that for on-line, real-time environments, the "nonremovable character of [its] disk is not as detrimental as one might initially conclude."

The forthcoming four-station cluster tape drive could prove to be an attractive OEM product, the IBM report observed.

IBM also expected Burroughs would give considerable attention to high reliability, availability and serviceability characteristics since it thought Burroughs would like to lead the market in dedicated communications-based on-line systems, the report indicated.

DP Growth Sharp or Sloping ?

(Continued from Page 43)

equipment that will be available in the next few years," he said. "It is the bread and butter of our industry and not speculation."

These technical drives are rapidly changing the cost of systems for programmers, operators and users, Clayton continued.

The $10,000 flosting-point minicomputer system is available hardware-wise today. The $1,000 version of this system is programmed now and should be available by 1980. A system of this type could easily cost no more than $100 by 1983, he maintained.

Returning to software, Clayton said it is the "long-term, real capital investment – both by the msnufacturer and the user.

"The hardware wears out in four to five years because the technology moves so rspidly," he stated.

As the cost of hardware goes down and computers find their way into the hands of more and more people, the major challenge facing manufacturers will be to make the intellectual investment on the part of users fit what they spend for these devices, Clayton warned.

People, then, should be the manufacturers' key focus. Ease of use should be the primary cost component of a system and the ultimate goal of its manufacturer.

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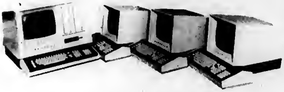

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In Commercial World

HP Forecasts Increasing Usage of APL

By Molly Upton
Of the CW Staff

CUPERTINO, Calif. — With the addition of APL to its 3000-II [CW, Sept. 20], Hewlett-Packard Co. (HP) foresees increasing use of the language in the commercial world, according to Ed McCracken, general manager of HP's General Systems Division.

"In some ways we're predicting a reaction much like the reaction we found when we introduced the first Basic language for small time-sharing systems back in 1968," McCracken said.

"At that time, there were several large service bureaus that were offering terminal time for Fortran and Basic at a very high cost, and that same equivalent position is true today," he said.

"For the first time, APL terminals will be available at a nice, affordable cost," he remarked.

The APL market is in its infancy, and it is one of the languages of the future, he added. "We're really enthusiastic about the increasing use of APL in the commercial world," McCracken said.

"At one time it was strictly a research-oriented language. We think we can expand significantly the use of APL because this is really the first time a really powerful APL has been brought down to a computer this small.

"We think there will be some major advantages to HP because of that," he commented.

Not Easy

"Doing a full extended APL on a system this size isn't particularly easy. It's a very demanding, very high-level language, and in fact we significantly expanded the instruction set of the 3000 to do APL," McCracken noted.

"We have a whole new [read-only memory] block dedicated to special microcoded instructions for APL, which enabled us to increase the execution of certain APL routines by 10 to 20 times."

He explained this does not make the executions that much faster than they would be on a large computer, but "makes response times acceptable on a system this size for an extended APL.

"We've been working on APL for three or four years. At one time we really weren't sure we could get this kind of a good APL on a system this size.

"By using some special techniques that haven't been used before to make a dynamic incremental compiler, we get major increases in response time," he said.

In explaining the relationship between the IBM 5100 and HP's 3000-II, he said, "As desktop computers do compete with time-sharing systems from time to time, there is some competition there."

But, he observed, the HP system supports approximately 12 APL terminals in "pretty hard APL usage."

APL fans, he explained, are totally committed to the language and represent a market in themselves. Their numbers are growing as more people come in contact with the language in universities and continue its usage, he said.

Acquisitions

Altek Corp. has acquired the Computer Equipment Division of Cetec Corp. in a move to expand its computer graphics capabilities.

Delta Electronic Control Corp. has purchased Static Power Co., a manufacturer of uninterruptible power systems, for an undisclosed amount of cash.

Optimum Systems, Inc. has agreed to acquire Computer Congeneric's banking business. Terms of the transaction have not been disclosed.

United Computing Systems, Inc. has agreed to acquire Infonational, Inc., a software and consulting firm, for an undisclosed amount of cash.

Greyhound Computer Corp. has acquired Cybernetics International GmbH, a German leasing company.

HP 3000-II Exceeds Expectations

CUPERTINO, Calif. — While Hewlett-Packard Co.'s (HP) General Systems Division anticipated the order volume for the HP 3000-II would double, the popularity of the Series II has exceeded that expectation, according to Ed McCracken, general manager of the division.

"The 3000-II is doing very well," he said. "We've exceeded all our expectations for order shipments, profits and customer satisfaction."

Delivery times are improving on the large systems, he said, adding the bottleneck in obtaining large disks from ISS-Univac is being solved.

"By the end of the month, we should be in good shape" regarding disk shipments, he said.

With the additional orders, the division has had to expand its customer training "really dramatically, and our lead times there are almost as long as on our systems, and that's a little bit of a problem," he added.

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Dedicated Sales Force 'Reincarnates' System 5000

By Molly Upton
Of the CW Staff

BURLINGTON, Mass. – Having made some of the classical marketing mistakes with its System 5000, Inforex, Inc. has remedied these errors and assigned a dedicated sales force to the system, according to William G. Moore Jr., vice-president of domestic operations.

With the recently upgraded capabilities of the system through the 505 software release (see story on Page 35) and the new marketing approach, Moore indicated the 5000 has been reincarnated.

Initially the 500 file management system was given to the five regional managers, who were told to hire systems engineers and sell it.

But it was difficult to convey the unique capabilities of the system, such as the ability to put up quickly, Moore said. In addition, the system was overpriced and was hard to sell, he added.

In January, Inforex reduced the 5000's price 20% and assigned a dedicated sales force and a product manager to the system.

CW Photos by M. Upton

Jack Hall

Jack Hall, product manager, said Inforex took a "situational look" at the market and found the 5000 fits well into three general categories: manual systems upgrade; real-time requirements in a batch environment; and for file management in a time-sharing environment. It can be used as a stand-alone system or as an adjunct to a mainframe, he said.

Moore observed the system is not specialized, and the firm realized its salesmen gravitated to users with certain types of situations which occurred regardless of the specific industry they were in.

Currently 24% of the 5000s installed are in the Federal government, and the firm recently tripled the size of its federal sales force; 14% are in state governments and 24% in manufacturing firms, Moore added.

Focusing on the type of environment the 5000 fits in, Hall explained the manual systems upgrade is that environment where the product operated on is paper, such as tracking correspondence, court dockets and claims processing.

In installations where there is batch capability, the 5000 offers an alternative to an on-line upgrade, he said.

Going on-line can be costly and time consuming and require a high skill level and continued system maintenance; users generally find the system doesn't accomplish the original scope of the project, he said.

The 5000 can be operational within weeks or months, he said.

As part of a subset of the time-sharing market, the 5000 satisfies requirements of file management, he said. For instance, the 5000 offers a given, fixed cost for file access rather than what could be a continually growing cost item, he explained.

William G. Moore Jr.

The 505 release will enlarge the market for the System 5000 both vertically and horizontally, Hall observed.

Biomedical Market Expected to Reach $6 Billion by '84

By Toni Wiseman
Of the CW Staff

LOS ANGELES – Biomedical instrumentation through the development of more highly sophisticated electronic devices, sensors, monitors and other equipment, is a key to future health care growth, according to Morton D. Schwartz of California State University.

In 1964, the cost of medical equipment used in hospitals was about $600 million, he said. This figure grew to more than $2.5 billion by 1974 and is expected to reach $6.3 billion by 1984.

Over 1,000 companies are currently producing instruments for the health care industry, Schwartz said.

"A new and indispensable partner for the modern health care team has been established in the emerging field of biomedical engineering," Schwartz stated.

"For the first time," he said, "engineers are being trained to develop medical electronic equipment to be used by hospitals and doctors and to assist the medical care team through rapidly successive technological advances."

Current efforts in this emerging field, he said, fall into three categories:

- Bioengineering, which he defined as "the application of engineering concepts and technology to scientific inquiries into biological phenomena for advancing the understanding of biological systems."
- Medical engineering, which uses engineering concepts and technology in the development of instrumentation, diagnostic and therapeutic devices and artificial organs.
- Clinical engineering, which applies engineering concepts, methodology and technology to the improvement of health service delivery systems.

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COMPUTER ASSOCIATES

Scheduled to Go Live Next Year

Air France System for Aeroflot May Be Delayed

By Ivan Berenyi

Special to Computworld

VILGENIS, France – The Soviet airline Aeroflot's Univac-based seat reservations system is likely to be delayed again, according to an Air France spokesman.

"We have already had quite a few delays and it would be optimistic to discount the strong possibility of having more," he admitted.

The contact, signed in mid-1974, gave systems responsibility to Air France after five years of negotiations with numerous parties (including IBM, Univac, Control Data Corp., Air France, Eastern, BOAC/Leasco): Univac will supply the 1106/2 mainframe configuration and Uniscope 100 terminals.

The first delay occurred when the U.S. government took one year to grant an export license for the system, but it has been installed in this southern suburb of Paris since last December.

Further delays have been caused not so much by changing specifications on the part of Aeroflot, but by unexplained visa problems, poor communications between Air France and Aeroflot in Moscow (all exchanges must to be channeled through the appropriate ministries) and the nonarrival of a commercial and operational staff of 50 persons expected for training in Paris since January.

Current indications are that the system will be transported from Paris to Moscow this October; this year, and it is scheduled to go live next February or March.

The Univac hardware has a theoretical capacity of four million to six million passengers per year (PAB) – well within Aeroflot's specifications for international reservations.

The Russians have a locally developed domestic reservations system, Sirena, based on two Minsk-32 processors. Originally intended to become the hub of an extensive network handling bookings on all internal flights (an annual volume of 80 million to 90 million PAB), Sirena currently operates only in the area around Moscow's domestic airport.

There are, however, long-term plans to link Sirena with Aeroflot's 1106-based international system, if only by a telegraphic hookup.

This could aid Aeroflot's ambitions to provide multihost services to the national airlines of fellow Comecon member-countries.

Aeroflot's Univac-based system is modeled closely on Air France's Alpha 3 system, which provides multihost capabilities to several other airlines. Like Alpha 3, it runs under the Air France-developed TOP real-time operating system and includes the multihost option.

International News

However, the growing success of Sita, the Paris-based international data network owned by about 140 airlines, in tendering seat reservations services to East European carriers on its recently purchased Gabriel system must leave Aeroflot's tenancy prospects substantially diminished.

ICL Cutting 16% Of Plant Force

LONDON – International Computers Ltd. (ICL) will be cutting back its manufacturing force by 16%, a cut of 1,400 jobs, over the next 14 months, according to *Computer Weekly* newspaper.

It is the rapid advances made in computer technology and the success of the 2900 series which has led to the staff cutbacks because, as ICL pointed out, the newer generation of machines "requires a much reduced labor content in its manufacture," the British paper said.

Production of the System 4 is being cut 80%, while the Termiprinter is being eliminated altogether..

The 1900 series' production is being cut 46%; production of the 2900s is being stepped up by 50%.

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NTT Sets 1978 Target for Digital Data Net for Japan

International News

TOKYO – Nippon Telegraph and Telephone (NTT) is developing a digital data transmission network in order to meet Japan's swelling demand for data communication services, according to the *EDP/Japan Report* (EDP/JR).

Under Japan's current system, digital signals have to be converted into analog signals before transmission.

Japan lags behind the U.S., Britain, West Germany, France, Canada and Sweden where actual digital network services or tests have been started, according to EDP/JR.

Japan's proposed network is not expected to be in use until March 1978, the report noted.

With the digital network, NTT hopes to reduce connection time to less than one second by employing data terminal equipment using character signals in addition to the dial pulse formula currently used, the report indicated.

This will permit the user to make the outgoing speed of selective signals from the data terminal identical to the data transmission speed.

NTT proposes to increase transmission speed from 50 bit/sec to 48 kbit/sec, according to EDP/JR.

Switching will be done in the form of digital signals within switchboards as well as in the digital data network. This means all pulse code modulation (PCM) pulses can be used as pulses for data signal transmission as a matter of principle, the report said.

In order to improve transmission quality, the PCM formula will be used for almost all transmission channels, resulting in channels highly resistant to noise and distortion; this should result in bit error improvement, the report stated.

Previously unavailable services such as speed change, code conversion, multiple address communication and message multiplex communications are also planned, according to EDP/JR.

In addition, the system will provide a combination of closed leased circuits similar to intracompany data communication systems to provide confidentiality, the report said.

Control System For USSR Region In the Works

Novosti Press Agency

Special to Computerworld

TOMSK, Siberia – The first stage of the automated control system (ACS) for managing the economy of the Tomsk region has been put into operation here.

This is the basic element of the countrywide automated system of collecting and processing information for the accounting, planning and management of the national economy.

In Tomsk, the ACS is seen as a means of running a social system rather than a purely economic and production project. Therefore, in this job humanities are as important as mathematics or engineering.

The organization of the ACS has made it possible to understand the relationship of the controversial combination of the interests of territorial complexes and the national economy as a whole.

The Tomsk specialists tried to determine the problem situation. "We understand it as a gap between the actual state of affairs and what is desired, both today and tomorrow," they said.

In the process of designing the ACS in the Tomsk region, three main stages appeared. In the beginning, the main task is to collect information about the system as a whole so every element of the control system, be it in Tomsk, Novosibirsk, or Moscow, can have complete information about the situation in the region.

This task can be accomplished successfully with the help of an automated system of master data banks on production, the population and the environment. The plan is to use those banks for storing information about the past and current state of affairs as well as the norms.

In its second stage, the ACS is used to specify functions in the management of the region.

The third stage is the drawing of comprehensive development programs aimed at the eradication of the existing and possible situations.

The Tomsk specialists attach much importance to centralization, that is, the pooling of all the services of the ACS in a single computer center.

This tangibly reduces the costs of control and management, raises the efficiency of the management system and makes it possible to release personnel to be used elsewhere.

The building for the future Tomsk integrated computer center already has been blueprinted and the comprehensive development program has been computerized.

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All Sycor systems are compatible, too. There's no retraining of operators or reprogramming required when it's time to upgrade the system at a specific location. That means the cost of growing is kept to a minimum.

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To learn more about all the ways the Sycor Model 410 can stretch your data processing dollar and increase the processing power of your remote locations, send in the reply card today. Or call the Sycor office nearest you. You'll find it in the Yellow Pages under "Data Processing Systems."

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First Church of Christ Scientist, Boston, Mass.

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J. F. McHenry, Manager, Computer Operations
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Saul Stimler is the Seminar Leader

Saul Stimler is President of Stimler Associates. He is a 16-year veteran in data communications and data processing. He has provided in-house training, specification preparation, design, evaluation, performance improvement, system planning, benchmarking and project management consulting services for leading companies and government agencies in the United States and Canada. Mr. Stimler is the author of the highly acclaimed book, *Data Processing Systems - Their performance, evaluation, measurement and improvement*, and this book will be an important part of the course materials. Advance copies are available - see the coupon below.

Charges and Enrollment

The charge for the entire 2-day seminar, including continental breakfasts luncheons, and all course materials is only $250 per registrant. This does not include hotel rooms, if necessary, but we have reserved space at the seminar hotels for attendees who wish them.

To enroll, look over the schedule below, fill in the coupon and send it in. Remember, enrollment is limited and no space can be firmly held until we have received check or purchase order.

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Dr. Dixon R. Doll is the Seminar Leader

Dixon R. Doll received his B.S. degree in Electrical Engineering (Cum Laude) from Kansas State University, and as a National Science Foundation Scholar he received his M.S.E. in Electrical Engineering and PhD in Systems Engineering from the University of Michigan. Dr. Doll has extensive experience with equipment vendors and users. He is the principal architect of the Communications Network Configurator, a family of computer programs used by the Raytheon Data Systems Company to design and analyze end-user computer-communications networks. As Head of DMW Telecommunications Corporation, which he founded, he designed Household Finance Corporation's North American Orbit network, involving more than 2700 terminals and 10 concentrators throughout the U.S. and Canada. He has developed teleprocessing network analysis software for many other major organizations, including Burroughs Corporation, IT&T, MCI; Proctor & Gamble, Sun Oil, Texas Instruments and VWR Scientific Corporation. He is also a visiting staff member of the IBM Research Systems Institute in New York, where he teaches courses on data communications fundamentals, teleprocessing network design and resource sharing computer networks. Dr. Doll, a founder and Technical Director of the International Communications Corporation's ICC institute in Miami, will lead the entire seminar.

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We have several top clients w/urgent needs for software Prog's strong in large scale IBM systs. You should be familiar with OS/MVT or OS/VS internals, SYSGENS, performance measurement, etc. Exp w/IMS on large TP networks a +. Multiple openings in Northeast & many other areas of U.S. (fee paid). Contact Bill Grady

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140 Federal Street
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(617) 423-6440

Systems Programming

- Do you have a thorough knowledge of the following hardware? B 3700 or B 4700 with B 9383 Disk Packs.
- Do you have at least two years experience in these software areas? NDL FORTE/2 MCPV.
- Would you like to work in a demanding and specialized aspect of Information Services where an experienced Programmer can be both challenged and rewarded?

If you can answer yes to these three questions, you may soon be employed by a top paying growth oriented corporation with outstanding benefits.

For confidential consideration, please send resume and salary requirement to:

Corporate Personnel
Relations Department
Westinghouse
Credit Corporation
933 Penn Avenue
Pittsburgh, PA 15222
Attn: Manager of Employment
An Equal Opportunity Employer

DIRECTOR, COURT INFORMATION SYSTEMS NEW ENGLAND

We are an international consulting firm conducting a search for a State Director of Court Information Systems. The successful candidate must have proven project management and EDP systems engineering experience. Your task: to direct an internal staff and subcontractors in the design, programming, implementation and management of a State Judicial Information System (SJIS). EDP environment IBM DOS/VS — COBOL and CICS. Preference will be given to individuals knowledgeable in criminal justice or state government systems.

This is a unique opportunity in one of New England's most desirable living areas. Salary mid 20's. Our client's employees know of this ad.

Send resume in strictest confidence to:

CW Box 4771
797 Washington St.
Newton, Mass. 02160
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CICS Programmer/Analyst

Experienced programmer/analyst required to lead project development in the area of medical records. The environment is a young medical school and the ultimate objective is development of health care support systems to assist in physican training and health care delivery. The computer center currently operates an IBM 370/125-2, with DOS/VS and POWER.

The required qualifications include a degree and at least five years data processing experience including at least one year of on-line application development using CICS. Successful project leadership experience must form a part of this background. Specific experience with medical records is strongly desired. Salary range $16,000-$18,000.

Personnel Office, P.O. Box 33932, Shreveport, Louisiana 71130.

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PROGRAMMER/ANALYST NEWSPAPER APPLICATIONS

Newspaper group seeking individual to work on corporate staff to assist divisions in installing business applications software. Forty to sixty percent weekday travel required. Newspaper experience preferred. Degree required. Experience with DEC computers and COBOL or RPG II helpful. Excellent opportunity for qualified candidate in a dynamic area of an exciting industry. Send resume and salary history to:

CW Box 4769
797 Washington St.
Newton, Mass. 02160

A large scale Massachusetts educational computer network is in need of expertise in severl areas. These positions are in support of several development projects in academic and administrative computing, using a Control Data Corporation Cyber-70 computer as host in a statewide network.

SYSTEMS PROGRAMMER

Participating and operating system. Maintenance and development in the areas of on-line administrative systems. Data base management and time-sharing systems. Requirements: B.S. in computer science or equivalent experience, 2-3 yrs. experience on large system — CDC-6000 and Cyber preferred. 1 yr. assembly language and/or system exposure.

USER CONSULTANT

Providing programming assistance to users of the network as well as some programming in support of short-term projects. Requirements: Bachelor's or equivalent experience, 2 yr. programming experience is required. CDC-6000 or Cyber 70 preferred. Previous user support experience is a plus.

ANALYST/PROGRAMMER

To participate in design and implementation of administrative systems, for Education—using integrated data base techniques. Requirements: Bachelor's or equivalent experience; 2-3 yrs. experience with administrative application on a large-scale system. CDC Cyber-6000 and/or educational administration experience preferred. CW Box 4769, 797 Washington St., Newton, Mass. 02160.

Project Leader

Supervise 1-2 on Point of Sale project — 370/125. Prefer retail business systems background. Ideal southeast city. Salary to 20K + bonus. FEE PAID. Call for immediate interview

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(502) 586-56397

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We perfer a well-rounded individual with extensive DIBOL experience who will have the ability to grow with our organization. Send complete resume and salary history including references to Mr. Al Chesser, PLYCOM Services, P.O. Box 160, Plymouth, IN 46563.

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For professionals in the following areas:

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Plan to attend the Chicago area Career Conference to take advantage of the outstanding job opportunities in the above fields plus many other professional areas. Send your resume, including current compensation, willingness to relocate and job objectives to:

Ms. Jane Lagas, Dir.
Women's Career Caucus
645 N. Michigan Ave.
Chicago, IL 60611
(312) 266-2401

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Investment Control, a leader in the field of computerized management information systems for automotive dealers, offers excellent opportunities for aggressive individuals who can assit in the development, implementation, and installation of dealer application packages involving on-line, mini-computer based in-house and batch systems. Mini-computer experience, a knowledge of the automotive business or experience in support of computer oriented small businesses application desirable, but not necessary. The ability to communicate ideas and discuss problems with all levels of management is essential. Immediate openings for this challenging position are available in many parts of the United States. Travel required. Top compensation plan. Many fringe benefits. Liberal car allowance. Write, giving resume of personal history, education, experience and earnings. All replies will be treated confidentially.

Investment Control
2 Northfield Plaza, Suite 100
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PROGRAMMERS

The individuals we seek should have a college degree, plus 3 to 5 years of programming experience in commercial systems COBOL or PL/1 experience is essential

These are selective openings for applications programmers on large scale IBM equipment, who are looking for an organization involved with such techniques as top down development and structured programming.

These positions are located in Marathon's General Office in Findlay, Ohio and offer relocation assistance, salary commensurate with education and experience, and a complete benefits package.

Interested? Pick up the phone NOW and call this number collect 419-424-0030 It will take just a few minutes of your time (we will accept calls from 8 a.m. to 4 p.m. eastern daylight time weekdays and from 1 p.m. to 4 p.m. eastern daylight time on Saturdays and Sundays) (Principals only, no agencies!)

MARATHON **Marathon Oil Company**

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PROGRAMMERS

RCA Florida and Overseas Positions

RCA Missile Test Project has openings for Computer Programmers who have working experience with any of the following equipment:

CDC 6000, 7000, CYBER Series;
CDC-MP60, 1700; XEROX SIGMA 5/7, 530;
UNIVAC UYK20; DEC LSI11; Beckman 420

B.S. in math, physics, computer science or related technical field required, plus one or more years applicable experience and knowledge of Assembly and/or Compiler level languages.

Mail resume, in confidence, with salary requirment and availability date to: W.W. Draper, RCA Missile Test Project, P.O. Box 4308, Patrick Air Force Base, Fla. 32925.

We are an equal opportunity employer F/M.

RCA

City of Fort Lauderdale Programmer II

Our Data Processing Division is currently developing on-line applications interfacing with geographically-related data bases. There is an immediate opening for an individual interested in participating in development and implementation efforts.

Must be able to work on a project team and perform all systems development tasks from problem solving and systems design through programming and implementation. Strong COBOL ability is essential.

Requirements are minimum of 2 years accredited college or technical study and 3 years applications programming experience, or an equivalent combination of education, experience and training. B.S. degree preferred.

TOTAL, DOS, ALC, on-line, municipal gov't experience preferred.

Salary Range is $13,029.12 to $16,626.97. Starting salary depends on qualifications. Send resume to:

Bruce A. Larkin
Assistant Personnel Director
Civil Service Department
P.O. Drawer 14250
Fort Lauderdale, Florida 33302.

IMS APPLICATIONS ANALYST

2 years experience on IMS applications with teleprocessing using Cobol. Must be familiar with OS, JCL on large scale IBM. Salary 15K to 22K, depending upon experience. In South Florida. Call (305) 358-9280 or send resume to Michael Rottblatt, Ott, Hertnar, Ott and Associates, 1401 Brickell Ave., Miami, Florida 33131.

PROGRAMMERS

LONDON, England

To $20,000 FEE PAID

Your choice of long term opportunity or annual contracts, including family relocation. Live in London with possible travel to Europe, Asia & Latin America.

Must have Message Switching experience preferably on PDP-11. Same experience on any other equipment acceptable. Initial interviews in U.S.A. by principal of this prominent British Corporation.

JELLENIK AGENCY
141 East 44th St.-NYC 10017
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Data Processing Manager

(To Hire Staff of Professionals in So. N.H.)

Client in equipment manufacturing area is seeking manager in start up department, who will have all responsibilities of hardware selection and staffing. We also need a **SYSTEMS MANAGER** through **PROGRAMMERS** with manufacturing or financial applications for this company. Any hardware, with language experience in COBOL, BASIC or ASSEMBLER would be a plus. Call or send resume as soon as possible to Robert Kelly.

(603) 893-4511 or
(617) 729-0660

CORICO CORP.
301 So. Broadway
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MANAGEMENT CONSULTANTS

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Please contact
Clement T. Chandler
or William Bond
Romac & Associates
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Suite 210
Atlanta, GA 30339
(404) 256-0433

Systems Analyst

Phoenix Arizona

Well known and prestigious avionics firm based in "The Valley of the Sun," is seeking a Systems Analyst with 3-5 years of experience in large scale environment (3rd or 4th generation). Individual selected will be a self-starter with definite growth potential, as well as having the ability to work with data base systems. Familiarity with Univac 1100 series would be helpful. Applications are varied to include M.R.P., financial systems, etc.

This challenging growth priented position provides a complete benefit package to include a dental plan, tuition refund program and relocation expenses.

For prompt consideration please direct resumes with present salary to:

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M/F

PROGRAMMER

High potential opportunity for a career minded professional in an expanding information services operation. Will work in a highly sophisticated on-line systems environment using 370-145 with DOS/VS and CICS/VS. This key position on a progressive staff requires at least 2 years BAL or COBOL programming experience. Knowledge of CICS required.

To creative performers in tune with a fast paced operation, we offer a starting salary between $12-15,000 and attractive benefits. Convenient Nassau/Queens border location.

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B-6700

Systems Programmer

San Francisco Bay Area

Provide systems support and development on Burroughs B-6700 computer. Min. 1 yr. of data communications exp., plus 3-5 yrs. of B-6700 systems programming experience required. A college degree and an ability to effectively interface with users in a teaching and consulting mode is essential.

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Raychem

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We're the Digital Software Documentation Group, a proud collection of Writers and Editors. We like being part of this organization, not just because Digital is an important computer company, but because we're important to Digital.

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What do we offer you?

An opportunity to work for a company that recognizes the importance of software documentation; to be an integral part of the development team.

An opportunity to work with a highly autonomous, highly charged group, where quality, not volume, is the objective.

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Theresa Buckley, Digital Equipment Corporation
162 Main St., Maynard, Ma. 01754
Local interview may be arranged.

digital
digital equipment corporation

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Medicus is a progressive company providing data processing and management engineering services to hospitals. We are continually expanding our client base and scope of service throughout the nation.

We are seeking experienced managers, analyst/programmers, and operations personnel for various locations. Experience requirements include familiarity with various medium and large scale computers. Hospital experience and knowledge of COBOL and On-Line applications desirable, but all experienced applicants will be considered.

Medicus offers challenging assignments in a growing environment with excellent opportunities for advancement.

Salary will be commensurate with education and experience. All replies will be handled confidentially. For prompt consideration, send your resume to:

PERSONNEL COORDINATOR
MEDICUS SYSTEMS CORPORATION
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As a leading innovator in the telecommunications field, GTE Automatic Electric Laboratories is developing electronic stored program controlled PCM switching systems to meet the needs of the telephone industry for modern TOLL and END OFFICE applications.

Challenging development positions are available in the areas of:

- Call handling software for real-time applications
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Requirements include a BS or MS in EE or Comp Sci and a minimum of 2 years experience in the design of on-line, real-time software (PL1 experience desirable).

Please submit a detailed resume stating salary history and requirements to:

David G. Crowley
Professional Employment
GTE AUTOMATIC ELECTRIC LABORATORIES
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East: Boston (617/237-3120), New York-New Jersey (201/687-8700), Philadelphia (215/665-1717), Washington, D.C. (703/790-5610).

Midwest: Chicago (312) 782-0857), Cleveland (216/771-2070), Detroit (313/352-6520), Kansas City (816/474-3393), Minneapolis (612/544-3600), St. Louis (314/862-3800).

South & Southwest: Atlanta (404/634-5127), Dallas (214/638-4080), Fort Worth (817/338-9300), Houston (713/626-8705), New Orleans (504/523-2576).

West Coast: Los Angeles (213/386-5500), Irvine, CA. (714/833-1730), Palo Alto (415/328-7155), San Francisco (415/434-2410).

LEAD SYSTEM ANALYSTS

A leading furniture company located in an attractive Virginia area, seeks three system analysts with manufacturing background; four or more years of progressive experience, supervisory experience and growth potential. Direct experience in production control and scheduling, sales order entry and/or cost accounting systems is essential. The successful individuals will require experience in development and implementation of the above systems, or specific experience in one of the systems. Technical requirements include data base systems with on line applications; COBOL and Burroughs experience preferred.

The Company offers attractive salary and benefits. Send confidential resume with salary history to:

CW Box 4770
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To formulate detailed field follow-up plans for Retail Point-of-Sale Systems Tests, Controlled deliveries, and ongoing field follow-up. Will implement data collection methods for field follow activities including site visits, customer contact, and interface with NCR Branch marketing personnel. Data Analysis and Failure Reporting activities (MTBF calculations, field performance curves, reporting, corrective action) are required.

A degree and applicable field evaluation work including statistical analysis and effective report writing along with computer industry experience are required including hardware, software, and system evaluation work.

We invite you to respond as your first step to joining us.

Robert W. Donovan
Terminal Systems Division - Cambridge
NCR Corporation
Cambridge, Ohio 43725
Phone: (614) 439-0398

NCR

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As one of the Midwest's leading multidivisional management and computer systems organizations, located 20 minutes from the University of Michigan, our steady growth requires top professionals.

Current Openings include:

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Top salaries, moving allowance and fully-paid fringes including life, health and dental insurances.

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Stable employment with a growth company. Opportunity to use your skills in modern technology. A chance to enjoy the good life in the sun belt. Excellent benefits offered by an industry leader. Join us as a:

SYSTEMS PROGRAMMER

CICS

Presently running VS 2 REL 1 on 370/158 and 370/155-II with HASP, Shared-spool, CICS, CALL-VS, TSO, etc. Degree preferred.

BUSINESS APPLICATIONS PROGRAMMER

Customer acct. project team. Must have at least 3 years experience COBOL on 370 OS. Degree required.

COMPUTER OPERATOR

OS/VS experience required for 370/158 installation. Currently utilizing teleprocessing, time sharing and batch processing.

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1-5 years auditing experience. Degree required.

Excellent salary and benefits. Send resume to:
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CP&L
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Raleigh, North Carolina 27602
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NEW YORK CITY PROGRAMMER ANALYST
360 DOS POWER

Major Retailer seeks candidata with COBOL 3 yrs, BAL min. 6 mos. RPG is a plus. DISK & TAPE. Excellent salary with all Major Benefits. Mail resume including selery history in strictest confidence.

To: Data Processing Dept.
Box 111
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Professor or Associate Professor

($18,120-$20,301)

Ph.D. required either in Computer Science or Business related area. Should have extensive knowledge in Business Applications of Computer Science, Permanent, full-time position available January, 1977. Teach undergraduate courses and aid in Curriculum development. Send transcripts and letters of recommendation to: Search Committee, Dept. of Math and Computer Science, Lock Haven State College, Lock Haven, Pa. 17745; oy October 15, 1976. Lock Haven State College is an Equal Opportunity Employer.

Systems Software Programmer

We're looking for a creative individuel with three to five years experience working with the UNIVAC 1100 Opereting System on UNIVAC 1100 Series mainframe and peripheral hardware.

As part of our Operating System group, you'll be involved in system generetion, Opereting System testing, and trouble shooting. Projects in computer performance evaluation, benchmark construction, and computer sizing are other challenging aspects of this group's responsibility.

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OPERATING SYSTEMS: You would work on ona of the most sophisticated DEC systems 10 sites in the Midwest. We hava plens to upgrede our existing 2 KI10s to 2 KL10s with 256K within one year. We need experienced people to develop assembly language application programs under TOPS10, do performence analysis, modify 6.02 TOPS10, and design end implement software for front end minicomputers in a reel time, fault tolerant anvironment.

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TELEMED provides e stimuleting and chellanging environment for highly qualified individuals. We have two Xerox Sigme 5 computers, two DEC KI10 computars and 5 minicomputars of various manufactura. We heve been described as tha lergest raeltima medical data processing facility in the world. We provide resources to meximize your afficiancy end technical achievements through your own CRT for timesharing or hands on minicomputer machine time. Our rapid growth creates advancement possibilities for the future. Please indicate eraas of interest in reply:

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Join This multi-national Industrial, staffing new EDP Dept. Need many "action oriented" professionals. Large scale epplications. Relocation & fee paid.

Systems Project Mgrs $18 - 20,000
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Send resume (state salary) to: S. Schoonmaker

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Large Manufacturing company located in the midwest is seeking an experienced computer service engineer to work on Honeywell G435 equipment. Excellent benefits. Send detailed resume including approximate salary requirement to C. W. Ramsey, Manager-Industrial Relations --

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PEERLESS INSURANCE CO.
62 Maple Avenue
Keene, New Hampshire 03431
Equal Opportunity Employer M/F

SYSTEMS ANALYST/ PROGRAMMER — IBM SYSTEMS 3

An opportunity to join a progressive company with a growing service bureau located in smell midwest town. This position offers a splendid opportunity for the right person who doesn't work by a time clock. Liberal benefits including hospital and major medical insurance and discount on gasoline purchases. All replies confidential. Send complete details to: Personnel Manager, Liberty Petroleum Co., Inc., P.O. Box 1208, Mt. Vernon, IL 62864.

DATA COMM. SPEC.

New Englend client wents expd individual to direct all T.P. plenning activities. Term Analysis, Network design, Futures, Vendor neg's, etc... are desired. Client has excellant DP reputation. Sal to $20K. Contact Sten Ourbas

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SALES

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Well established organization in sales and leasing of pre-owned computers. Requires well experienced person to sell full line of IBM 360/370 Systems and Peripherals, & Financial Terminals. ALSO, distributors of sensational NEW Mini-Computer. New York area only.

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PROGRAMMER OR PROGRAMMER ANALYST

Lerge repdily growing midwestern Property & Casualty Insurance Company has opportunities for experianced data processing personnel.

PROGRAMMER/ANALYST - 1-3 yeers systems end programming experience using COBOL under OS. Insuranca experience in the erees of statisticel premium, loss processing or peyroll personnel, preferred but not necessary.

These positions offer an attractive salary and comprehensive benefit package. Convenient downtown St. Paul location. For futher information, please call (612) 221-7005 or write:

Employee Relations Department
St. Paul Fire and Marine
Insurance Company
385 Washington Street
St. Paul, Minnesota 55102

The St Paul

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SYSTEMS AND PROGRAMMING SUPERVISOR

$1453-1767

So. Calif. city of 161,000 has immediate opening. Requires 3 yrs. exp. in systems & procedures analysis including 1 yr. of supervisory exp. and Bachelor's degree from eccredited college or university. Additional exp. mey substitute for ed. Apply by Oct. 18, 1976.

City of Riverside
Personnel Department
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Riverside, CA 92501
AEO/AAE/M-F

PUBLICATIONS — MANAGER

We are a rapidly expanding computer services company offering a position with continuous personal growth opportunities, menaging our publications department.

As part of our dynamic marketing group, major responsibilities encompass publication of sales literature as well as reference manuals and documentetion for utilization of our computer time sharing services.

College education or equivalent, technical writing experience and exposure to data processing required. Good benefit program. Send resume to Personnel Manager.

COMPU-SERV NETWORK, INC.
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Equal Opportunity Employer, M/F

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The United Brends Company, a multi-netional organization, has an opening for a high level individuel with heavy experience in technical support areas for a newly formed department. Recent alignments of in-house responsibilities have created the need for this department.

This position requiras tha ability to evaluato, develop, instell and maintain hardware and softwara, and to develop a VS-1 conversion plan for our Boston data processing facility.

Candidates should have 3 to 5 years' experience in technical areas with amphasis on 370 systam architecture, software enelysis and development and systems programming. A sound knowledge of the facilities of OS, HASP, RJE, utilities, JCL, compilers and assemblers is raquired. Especially useful would be VS-1 implementation experience and the ability to work with a minimum amount of direction.

Please submit resume, including salary history, to E. Connelly, UNITED BRANDS, Prudential Canter, Boston, Mass. 02199, or call 262-3000, ext. 419 for further information.

UB UNITED BRANDS COMPANY

We are an equal opportunity employer.

Two (2) Associate Directors University Computing Center

(Both will hold Faculty Rank)

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Duties include dealing with instructional and research faculty of a large, diverse University on computing activities and needs ranging from special purpose laboratory mini-computers to large scale batch and interactive computing. This Associate Director will work closely with the Director and the Associate Director for Technical Computing and six departmental menagers toward plenning, developing, end implementing computing support functions for undergraduate and graduate instruction and academic research programs. Will manage personnel. Qualifications sought in applicants for this position include the following: Ph.D. essential, preferably in Computer Science or related field; some academic teaching and/or research experience plus current experience in a medium to large scale higher education or research computing center; desire experience in middle or upper management of a computing canter; professional knowledge of state-of-the-art of academic computing technologies such as interactive timeshering, graphics, CAI.

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Duties include dealing with technical support personnel (software and hardware) of the Computing Center, vendors of hardware and software systems, as well as faculty and staff of the University. This Associate Director will work closely with the Director, Associate Director for Academic Computing end six departmentat managers toward planning, developing, and implementing computing support functions for academic, research, and administrative activities of the University. Will manage personnel. Qualifications sought in applicants for this position include the following: M.S. or Ph.D., preferably in Computer Science or related field; in-dpeth technical experience with medium to large scale IBM systems, both hardware and system control software; experience in middle or upper management of a computing center; professional knowledge of the state-of-the-art in IBM systems such as MVS, VM, CMS/APL, IMS and SNA.

Both of these Associate Directors will report to the Director of the Computing Center and will together form the senior management team to lead a complex and sophisticated leading-edge University Computing Center. Either position can provide for a limited amount of instruction and/or research activity if so desired. Presently, the Computing Center has approximately 75 employees. The hardware consists of two 3 megabyte S/370 model 158's (one model III), 3350 disk units, a 3705 with a large communications network. The software systems include MVS, VM, IMS and VM/CMS.

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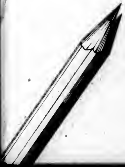

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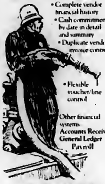

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DPF Shows Earnings Decrease for Year

HARTSDALE, N.Y. – DPF, Inc. showed a decrease in earnings for the year ended May 31, but an increase for the fourth quarter compared with year-ago figures.

However, the firm's operating income dropped in the year and showed a loss for the fourth quarter.

Infusion From IBC

Much of the company's bottom line in both periods reflected the infusion of the firm's equity in earnings of Interstate Brands Corp. (IBC), acquired during the year.

DPF indicated it will no longer apply the break-even accounting basis with respect to its IBM 360 leasing operations.

The company expects to report profits from this area in the first quarter of fiscal 1977, it said. DPF has reported results from its 360 base on a break-even accounting basis since June 1, 1971.

During the year, the firm acquired 49.5% of the outstanding common stock of IBC, a large wholesale baking company, with funds generated internally from its 360 portfolio, Chairman Bertram J. Cohn said.

Bought 370s

DPF also acquired 370s worth about $27 million for its own account, he added.

For the year, revenues dropped to $22.8 million compared with $25.5 million last year.

Earnings for 1976, including $1.4 million from IBC and a tax credit of $30,000, totaled $1.9 million or 47 cents a share.

This compares with 1975 earnings of nearly $4.9 million or $1.19 a share, including a $2.3 million tax credit and a $2.2 million gain on repurchase of debentures.

Operating Income

For the year, operating income fell to $217,000 compared with $379,000; during the quarter, the firm showed an operating loss of $290,000 compared with income of $161,000 in the year-ago period.

During the quarter, earnings rose to $360,000 or 9 cents a share compared with $263,000 or 6 cents a share in the year-ago period, when there was a $104,000 tax credit.

Revenues for the quarter rose slightly to nearly $5.5 million compared with $5.4 million in the same period last year.

Sycor Revises 1976 Outlook

ANN ARBOR, Mich. – Sycor, Inc. has revised downward its projections for revenues and earnings for the year, reflecting an expected decrease in the level of foreign revenues.

President Samuel N. Irwin indicated domestic business is excellent and the company has accelerated the rate of its investment in the domestic sales force and in product development.

However, "although the Olivetti relationship continues to be excellent, Sycor has reduced its projections of shipments to Olivetti for the remainder of the year," Irwin explained.

"Uncertainties with regard to November and December shipping schedules remain and appear to relate primarily to trade restrictions causing a disruption of Olivetti sales in South America and to year-end inventory planning throughout the Olivetti organization," he said.

Quarter Increase Marks AJ Trend

SUNNYVALE, Calif. – Anderson Jacobson, Inc.'s (AJ) results for the first quarter showed a continuing trend of increasing revenue and earnings.

Earnings for the quarter ended June 30 reached $234,181 or 10 cents a share compared with $194,572 or 8 cents a share in the year-ago quarter.

Revenue for the quarter was $4.7 million compared with $4 million a year ago.

"The problems that caused the reduced order input [in previous quarters] have been corrected for the most part. The sales department is now back to full strength," according to Raymond E. Jacobson, AJ president.

"Our new keyboard-printer terminal, the AJ 832, is now coming off the production line in sufficient quantity," he said.

Decision Data Dips in Six Months

HORSHAM, Pa. – Decision Data Computer Corp. suffered a loss in the first half of the year despite a healthy second quarter.

Earnings for the quarter were $29,000 or 1 cent a share compared with a loss of $31,000, offset by a $99,000 tax credit in the year-ago quarter.

Revenues Dropped

Revenue for the quarter was $9.09 million, down from $11.2 million in 1975.

In the six months, the firm lost $592,000 compared with earnings of $493,000 or 13 cents a share, including a $261,000 tax credit, in the year-ago period.

Revenue for the first six months declined to $16.8 million compared with $22.8 million in the comparable year-ago period.

MCS Reports Records In First Six Months

ELMSFORD, N.Y. – MiniComputer Systems, Inc. (MCS) reported record sales and earnings for the first six months.

Revenues for the period ended April 30 totaled $3.6 million compared with $2 million for the same year-ago period.

Earnings rose to $337,000 or 51 cents a share compared with $272,000 or 44 cents a share in the year-ago period when there was a $95,000 credit.

AMS Net Doubles In Nine Months

SUNNYVALE, Calif. – Advanced Memory Systems, Inc.'s (AMS) earnings for the first nine months more than doubled with the help of a $1.2 million tax credit.

Earnings for the quarter ended June 25 were $787,000 or 30 cents a share compared with $665,000 or 26 cents a share, including a $316,000 tax credit, in the third quarter of 1975.

Revenue for the quarter rose to $9.7 million compared with $8 million in the year-ago period.

Nine-month earnings were $3.3 million or $1.27 a share, including the $1.2 million tax credit, compared with $1.4 million or 56 cents a share in the comparable 1975 period, which benefited from a $676,000 tax credit.

Revenue for the first nine months increased to $29.3 million compared with $23.2 million a year ago.

New Registrations

ADVANCED MEMORY SYSTEMS, INC., 1275 Hammerwood Ave., Sunnyvale, Calif. 94086, a semiconductor manufacturer, filed to register 2,783,955 shares of common stock to be issued in conjunction with the merger of Intersil, Inc. with Advanced Memory Systems, Inc.

DATA RESOURCES, INC., 29 Hartwell Ave., Lexington, Mass. 02173, a firm providing computer-accessible economic data banks and econometric models and forecasts, filed to register 371,320 shares of common stock, of which 132,500 shares are to be sold by the company and the remainder by certain stockholders. The underwriter is William Blair & Co., 135 S. LaSalle St., Chicago, Ill. 60603.

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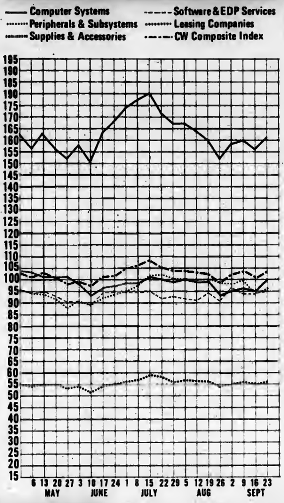

Earnings Reports

ADVANCED COMPUTER TECHNIQUES
Year Ended March 31

	1976	1975
Shr Ernd	$.28	$.24
Revenue	9,351,718	8,202,894
Earnings	322,405	282,210

INTEL
Three Months Ended June 30

	1976	1975
Shr Ernd	$.52	a$.35
Revenue	50,624,000	31,501,000
Earnings	5,504,000	3,613,000
6 Mo Shr	.99	a.71
Revenue	96,108,000	61,866,000
Earnings	10,507,000	7,305,000

a-Adjusted for a 50% stock dividend paid in May 1976.

MEMOREX
Three Months Ended June 30

	1976	1975
Shr Ernd	$1.58	$1.29
Revenue	80,839,000	65,620,000
aSpec Cred	3,132,000	4,881,000
Earnings	9,156,000	6,216,000
6 Mo Shr	3.18	1.62
Revenue	160,258,000	127,245,000
aSpec Cred	6,926,000	5,456,000
Earnings	18,239,000	7,799,000

a-Consists of gains from tax-loss carry-forwards and sale of debentures.

SYCOR
Three Months Ended June 27

	1976	1975
Shr Ernd	$.45	$.48
Revenue	17,296,000	13,116,000
Tax Cred	.....	285,000
Earnings	1,545,000	1,357,000
6 Mo Shr	.87	.92
Revenue	33,090,000	24,312,000
Tax Cred	.....	666,000
Earnings	2,783,000	2,573,000

MOHAWK DATA SCIENCES
Year Ended April 30

	1976 (000)	b1975 (000)
Shr Ernd	$1.92	.....
Revenue	161,672	$179,109
Disc Op	.....	(668)
aSpec Cred	11,455	.....
Earnings	13,560	d(21,677)
3 Mo Share	1.28	.....
Revenue	41,026	44,512
aSpec Cred	9,418	.....
Earnings	10,178	d(11,457)

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, SEPTEMBER 22, 1976

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1976 RANGE (1)	CLOSE SEP 22 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	84-108	95 1/2	+4 1/2	+4.9
C	COMPUTER AUTOMATION	10- 19	17 5/8	+1 5/8	+10.1
N	CONTROL DATA CORP	18- 27	23 7/8	+ 5/8	+2.6
N	DATA GENERAL CORP	40- 60	41 1/4	+2 1/4	+5.0
O	DATAPOINT CORP	24- 46	31 1/4	-3 1/2	-10.0
O	DIGITAL COMP CONTROL	2- 7	6 5/8	+ 3/4	+12.7
N	DIGITAL EQUIPMENT	138-181	162 3/4	+3 3/4	+2.3
N	ELECTRONIC ASSOC.	2- 5	2 5/8	0	0.0
A	ELECTRONIC ENGINEER.	7- 16	9 3/4	+ 1/2	+5.4
N	FOXBORO	28- 50	49	+4 1/4	+9.4
O	GENERAL AUTOMATION	5- 11	5 3/4	- 1/2	-8.0
C	GRI COMPUTER CORP	1- 1	7/8	+ 1/8	+16.6
N	HEWLETT-PACKARD CO	85-117	95	+4 1/8	+4.5
N	HONEYWELL INC	34- 56	47 3/4	+3 1/4	+7.3
N	IBM	227-288	285 1/2	+7 1/4	+2.6
O	MANAGEMENT ASSIST.	1- 3	1 5/8	-	-3.7
O	MEMOREX	18- 33	22 3/4	+2	+9.6
O	MICRODATA CORP	10- 28	27	+ 3/4	+2.8
C	MODULAR COMPUTER SYS	4- 14	4 1/4	+ 3/4	+21.4
N	NCR	24- 37	36 7/8	+1 1/4	+3.5
C	PRIME COMPUTER INC	4- 14	12 1/4	- 3/4	-5.7
N	PERKIN-ELMER	19- 27	22 7/8	+ 1/8	+0.5
N	RAYTHEON CO	45- 61	66 3/4	+4	+6.3
N	SPERRY RAND	40- 52	49 3/4	+2 3/4	+5.8
O	SYCOR INC	13- 31	13 3/4	-6 1/2	-32.0
A	SYSTEMS ENG. LABS	6- 10	6 7/8	0	0.0
N	VARIAN ASSOCIATES	13- 17	14 1/2	+ 5/8	+4.5
A	WANG LABS.	11- 20	16 5/8	- 1/8	-0.7

LEASING COMPANIES

EXCH		PRICE 1976 RANGE (1)	CLOSE SEP 22 1976	WEEK NET CHNGE	WEEK PCT CHNGE
C	COMDISCO INC	3- 10	7 1/2	0	0.0
A	COMMERCE GROUP CORP	2- 3	2 1/8	+ 1/8	+6.2
A	COMPUTER INVSTRS GRP	1- 3	1 3/4	+ 1/8	+7.6
M	DATRONIC RENTAL	0- 1	7/8	0	0.0
A	DCL INC	1- 1	5/8	0	0.0
N	DPF INC	5- 8	7 1/8	+ 1/8	+1.7
N	ITEL	6- 15	13 1/4	+ 1/2	+3.9
N	LEASCO CORP	6- 19	17	0	0.0
O	LEASPAC CORP	0- 1	1/4	0	0.0
O	NRG INC	0- 1	3/8	0	0.0
A	PIONEER TEX CORP	6- 9	7 1/4	0	0.0
N	U.S. LEASING	7- 12	9 3/4	+ 1/2	+5.4

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1976 RANGE (1)	CLOSE SEP 22 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 3	1 3/4	+ 1/8	+7.6
C	ANACOMP INC	6- 11	7 3/8	+ 1/2	+7.2
A	APPLIED DATA RES.	2- 4	4	+ 3/4	+23.0
N	AUTOMATIC DATA PROC	17- 35	32	+ 7/8	+2.8
C	COLEMAN AMERICAN COS	2- 6	2 1/2	0	0.0
O	COMPUTER DIMENSIONS	3- 7	5 1/4	0	0.0
C	COMP ELECTION SYSTMS	5- 9	6	- 3/4	-11.1
C	COMPUTER HORIZONS	1- 2	1 1/4	- 1/4	-16.6
C	COMPUTER NETWORK	2- 6	5 1/4	+ 7/8	+20.0
N	COMPUTER SCIENCES	4- 8	6 3/8	+ 1/8	+2.0
O	COMPUTER TASK GROUP.	1- 1	1	0	0.0
C	COMPUTER USAGE	3- 6	3	0	0.0
C	COMSHARE	2- 9	5 1/4	0	0.0
O	DATA DIMENSIONS INC	2- 4	2 5/8	0	0.0
C	DATATAB	1- 1	1 3/8	0	0.0
N	ELECTRONIC DATA SYS.	12- 18	15 1/2	- 1/8	-0.7
C	INFONATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE CORP	1- 3	1 5/8	- 1/8	-7.1
C	IPS COMPUTER MARKET.	1- 2	1 1/8	0	0.0
O	KEANE ASSOCIATES	2- 4	2 1/4	0	0.0
C	KEYDATA CORP	2- 5	1 5/8	- 1/4	-13.3
C	LOGICON	3- 4	3 3/8	0	0.0
A	MANAGEMENT DATA	1- 3	2 3/4	+ 3/4	+37.5
A	NATIONAL CSS INC	13- 25	21 1/8	0	0.0
A	ON LINE SYSTEMS INC	18- 22	20	0	0.0
N	PLANNING RESEARCH	3- 5	4	+ 3/8	+10.3
C	PROGRAMMING & SYS	1- 1	3/8	0	0.0
O	RAPIDATA INC	2- 5	2 1/8	0	0.0
C	REYNOLDS & REYNOLDS	13- 21	14 3/4	- 1/4	-1.6
C	SCIENTIFIC COMPUTERS	1- 7	1	0	0.0
O	TYMSHARE INC	17- 28	17 1/4	-8 1/4	-32.3
A	UPS SYSTEMS	3- 5	3 7/8	+ 3/8	+10.7
N	WYLY CORP	2- 7	1 3/4	+ 1/8	+7.6

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1976 RANGE (1)	CLOSE SEP 22 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	8- 13	10 5/8	+1 3/4	+19.7
O	ADVANCED MEMORY SYS	4- 10	6 5/8	+ 1/4	+3.9
N	AMPEX CORP	5- 10	7 1/2	+ 1/2	+7.1
C	ANDERSON JACOBSON	2- 4	2 7/8	- 1/8	-4.1
C	APPLIED DIG DATA SYS	13- 25	19 3/4	+1	+5.3
O	BEEHIVE MEDICAL ELEC	3- 9	9	+ 1/4	+2.8
A	BOLT,BERANEK & NEW	7- 11	8 5/8	+ 5/8	+7.8
N	BUNKER-RAMO	5- 10	7 3/4	- 1/8	-1.5
A	CALCOMP	4- 7	4 1/2	+ 1/4	+5.8
O	CAMBRIDGE MEMORIES	0- 6	3/8	- 1/8	-25.0
N	CENTRONICS DATA COMP	20- 36	34 1/2	+ 1/4	+0.7
C	CODEX CORP	22- 42	35	-1	-2.7
O	COGNITRONICS	1- 1	7/8	0	0.0
C	COMPUTER COMMUN.	1- 6	6 1/2	+ 3/4	+13.0
C	COMPUTER CONSOLES	4- 7	4 1/2	- 1/2	-10.0
A	COMPUTER EQUIPMENT	1- 3	1 3/4	0	0.0
C	COMPUTER TRANSCEIVER	1- 3	1	+ 1/8	+14.2
O	COMTEN	4- 9	8 1/2	+ 1/4	+3.0
A	CONRAC CORP	20- 25	22 7/8	+1 1/4	+5.7
O	DATA ACCESS SYSTEMS	1- 4	4 3/4	+ 1/2	+11.7
O	DATA 100	7- 13	8 1/2	+ 1/8	+1.4
A	DATA PRODUCTS CORP	5- 15	12 5/8	+ 1/4	+2.0
O	DATA TECHNOLOGY	1- 2	1 5/8	+ 1/8	+8.3
O	DATUM INC	1- 2	1 3/8	0	0.0
O	DECISION DATA COMPUT	1- 4	1 1/4	- 1/4	-16.6
O	DELTA DATA SYSTEMS	1- 1	3/4	- 1/4	-25.0
N	ELECTRONIC M & M	1- 4	3 1/2	+ 3/8	+12.0
O	FABRI-TEK	1- 1	5/8	- 1/8	-16.6
O	GENERAL COMPUTER SYS	1- 2	1	0	0.0
N	HAZELTINE CORP	4- 12	8 3/4	+ 1/4	+2.9
N	HARRIS CORP	34- 55	52 1/2	- 3/4	-1.4
A	INCOTERM CORP	9- 20	11 5/8	+ 1/4	+2.1
C	INFOREX INC	3- 7	5	+1 1/8	+29.0
C	INFORMATION INTL INC	10- 18	12 1/8	+ 5/8	+5.4
O	INTEL CORP	59-109	63	-2	-3.0
A	LUNDY ELECTRONICS	3- 7	3 3/4	+ 1/2	+15.3
O	MSI DATA CORP	3- 7	5 7/8	- 1/8	-2.0
A	MILGO ELECTRONICS	15- 21	18	+1 3/8	+8.2
N	MOHAWK DATA SCI	3- 10	7 3/4	+ 7/8	+12.7
O	PENRIL CORP	1- 3	2	0	0.0
A	PERTEC CORP	3- 8	7 1/8	+ 1/4	+3.6
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
C	PRECISION INST.	4- 10	3	-1	-25.0
C	QUANTOR CORP	4- 6	4 1/8	0	0.0
O	RECOGNITION EQUIP	6- 11	9 1/4	+1 3/4	+23.3
N	SANDERS ASSOCIATES	6- 11	9 1/2	+ 3/4	+8.5
O	SCAN DATA	2- 4	1 7/8	0	0.0
C	STORAGE TECHNOLOGY	9- 13	11 7/8	+ 5/8	+5.5
C	T BAR INC	5- 10	5 7/8	0	0.0
O	TALLY CORP.	4- 6	4 1/4	0	0.0
O	TEC INC	3- 6	5 3/4	+ 1/2	+9.5
N	TEKTRONIX INC	45- 61	61	+5 3/4	+9.3
N	TELEX	2- 5	3	0	0.0
C	WANGCO INC	11- 22	21 1/8	0	0.0
O	WILTEK INC	2- 2	1 3/4	- 3/8	-17.6

SUPPLIES & ACCESSORIES

EXCH		PRICE 1976 RANGE (1)	CLOSE SEP 22 1976	WEEK NET CHNGE	WEEK PCT CHNGE
C	ADVANCED SYSTEMS INC	1- 4	3 1/4	0	0.0
O	BALTIMORE BUS FORMS	4- 5	3	+ 1/2	+20.0
A	BARRY WRIGHT	6- 10	9 1/8	+1 5/8	+21.6
C	CYBERMATICS INC	1- 1	1/2	0	0.0
A	DATA DOCUMENTS	25- 42	30 7/8	- 1/8	-0.4
C	DUPLEX PRODUCTS INC	13- 24	13 1/2	- 1/8	-0.9
N	ENNIS BUS. FORMS	6- 8	6 1/4	0	0.0
O	GRAHAM MAGNETICS	8- 13	10 1/2	+1 1/4	+13.5
O	GRAPHIC CONTROLS	13- 19	16 3/4	+1 3/4	+11.6
N	3M COMPANY	53- 66	66 1/8	+3 3/8	+5.3
C	MOORE CORP LTD	35- 51	35 1/4	- 1/2	-1.3
N	NASHUA CORP	11- 18	17 3/4	+1 1/4	+7.5
O	STANDARD REGISTER	15- 19	16 1/4	+ 1/2	+3.1
C	TAB PRODUCTS CO	5- 11	10 1/4	0	0.0
N	UARCO	20- 25	20 1/8	+ 1/4	+1.2
A	WABASH MAGNETICS	4- 8	7 1/4	+ 1/8	+1.7
N	WALLACE BUS FORMS	19- 25	22 3/8	+1 3/8	+6.5

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